

3-9

⊙

A
DEMONSTRATION
OF THE
Existence and Providence
OF
G O D,

From the Contemplation of the
Visible Structure of the
Greater and the Lesser World.

IN TWO PARTS.

The First, shewing the Excellent Con-
trivance of the *Heavens, Earth, Sea, &c.*

The Second, the Wonderful Formation
of the *Body of Man.*

By JOHN EDWARDS, B. D. sometime
Fellow of S. John's College in Cambridge.

LONDON,

Printed by J. D. for Jonathan Robinson at the
Golden Lion, and John Wyat at the Rose
in St. Paul's Church-Yard. 1696.

Phil 8659.2

DEMOMSTRATION

OF THE

GOAL

From the Communion of the
Vindictive of the
Governer and the People only

In Two Parts
The first, Being the History of
the second, Being the History of
of the Body of the

BY JOHN EDWARDS, D.D.
Professor of Divinity in the College of William and Mary

Printed by J. D. for Thomas
Golden Lion and John W.
in St. Paul's Church-Yard.

TO THE
Most Reverend Father in God,
His GRACE
THOMAS
By Divine Providence Lord
Archbishop of Canterbury, Primate
and Metropolitan of all
England, &c.

May it please your Grace,
HAVING lately presented your Grace with
a short Essay concerning the Cau-
ses and Occasions of Atheism,
I thereby in a manner obliged my self to dedi-
cate this following Treatise to your Venerable
and Illustrious Name; for that was but a Pre-
paratory Introduction to this. It is certain
your Grace hath Right to both, because you
A 2 have

have shew'd your self a strenuous Asserter and Defender of the True and Orthodox Faith concerning the Deity, and betimes exploded the Vanity and Inconsistency of the Hobbian Creed relating to this Great Concern. And not only before, but since your Arrival to the Metropolitan See, you have signally owned and patronized this Cause which I undertake; and (on the contrary) you have (as becometh your High Place) publicly discountenanced, and given check to the Abettors of Atheism.

I profess my self to be one that abhors unnecessary Disputes, and loves a Free and Ingenuous Latitude in Matters that are of an Indifferent nature. But when I see the Grand Points of our Holy Religion shock'd by Prophane Assailants, when I behold Impiety and Atheism lifting up their daring heads amongst us, I think my self indispensably concern'd (according to that Talent which the Divine Goodness hath been pleas'd in any measure to confer upon me) to grapple with the Bold and Vaunting Adversaries, to make Opposition to their extravagant Attempts, and to assert and defend

Dedicatory.

v

defend that Cause which is the Basis of all Religion, the Supporter of Kingdoms, and the Glory of our Lives. This is that which I at present design, and humbly crave your Grace's Acceptance of what I here offer.

But whilst I implore your Patronage, I will not apparently incur Your Displeasure, (and at the same time Injure the whole Nation) by diverting and detaining your Grace any longer: Wherefore I take my Leave of your Grace, and am glad I have this farther Opportunity of publishing to the World that I am,

Your Grace's most bounden

Servant, and dutiful Son,

John Edwards.

The P R E F A C E.

I Could have presented the Reader with many more Observations on the Particulars which I handle in the ensuing Discourse, especially on *Animals*, for (besides what Remarks I have made my self) many Learned Enquirers not only of * old, but † lately have given us a distinct and full Account of the Nature of them. But my Business was to take notice only of the most eminent of them, and that so far as they are evident Arguments of a *Deity*, i.e. of the Divine Wisdom in contriving their Make and Structure. And on *other* Works of the Creation, I could have expatiated much more than I have done; but it being not my *Chief Province*, I did not think it would be expected of me, especially when that which I have said is sufficient for my present purpose. Nor did I design a particular Philosophical Account of all the things I treat of, because this is to be found in the known Treatises of *Physicks*. And as to the latter Part of my Undertaking, I could have more largely insisted on the Parts of the Body, but that had been to transcribe the Books of *Anatomy*. I reckon'd it therefore enough to give a Solution of the Main Phænomena's in this Humane System,

* Aristotle, Pliny, Ælian, Theophrastus, &c.

† Albertus Magnus, Gesner, Aldrovandus, Jonston, Willoughby, Ray, Lister, &c.

stem, and to bring all by rational Deduction to this Conclusion, that they are caus'd by an Intelligent Mind.

If I cannot by this Attempt *convince* Atheists, (which perhaps is next to blanching an *Ethiopian*) yet I hope I shall do something towards preventing the Spreading of that pernicious Infection which they are the Authors of; I hope I shall effect something towards checking the Progress of that Hellish Ferment which works in the World at this day. It may be what I shall offer will be serviceable to bridle the Insolence of those bold Men, and to make them recoil and give back. It may be it will cripple and disable them, though they make a shift to be upon their Feet. Perhaps it may give them a Mortification, though they will not let us know so much. Or, if my Hopes fail me as to this, yet I will not despair of *Confirming*, and *Strengthening* such who are really perswaded of the Doctrine here treated of. I may be helpful to establish these Persons in their Belief, though I cannot reclaim the Infidelity of others. But this is not the height of what I aim at; for, besides what I have already suggested, my Intention is that this Discourse should afford variety of matter to the *Religious* for their Devout Contemplations. I have set the *Greater* and *Lesser World* before them, and have so display'd the several parts of both, that they may every where discern the Eternal Godhead. I

have propounded those Visible and Remarkable Topicks whence pious Minds may infallibly deduce the Truth and Reality of Providence, and the adorable Excellency of the Power, Wisdom and Goodness of God, and his other Divine Perfections and Properties which respect Mankind. If I had not chiefly design'd these Papers for such, I should not have so often alledg'd the *Holy Scriptures*: which with the other sort of Men are in no esteem, and are thought to have no Authority; no more than the *Alcoran*, or some *Legendary Tale*. But all those that have a true Sense of Religion on their Spirits, reverence and prize these Writings next to the Blessed Author of them; and they know that it is proper to prove a God out of his Own Book. The Reader may observe that I frequently make use of *Scripture* in setting forth Natural things, those which appertain to the *Heavens, Earth, Sea, &c.* and *the Body of Man*; because I would let the World see that this Holy Book is not only useful as to Divine and Spiritual Matters, but even in respect of all sorts of *Humane Learning*, which I have on another occasion amply proved. Having thus propounded the Designs of my Undertaking, (and if I be successful in any of them, I shall reckon it a great Happiness) I will enter upon the Work it self, by the Assistance of Him whose Existence and Providence I am now to demonstrate.

THE

THE
CONTENTS.

PART I.

CHAP. I.

THE Argument of the following Discourse is suited to the Genius of those for whom it is chiefly designed. God's Being and Providence are proved in General: 1. From the Harmony and Connection of the things in the World. Where is shew'd wherein this Harmony consists, and how the Notion of Chance is baffled by it. 2. From their Excellent End and Designs, the chief of which is to be serviceable to Man. Both Animate and Inanimate Creatures conspire in this, being actuated by a Divine Director and Disposer. This ruins Monsieur Des Cartes's Opinion, whereby he attempts the solving of all things by Mechanick Principles. This also confounds his Denial of Final Causes in Natural Philosophy. pag. 1.

CHAP. II.

The Author proceeds to a Particular Proof of the Divine Existence and Providence from the Consideration of the Heavenly Bodies. The unrivall'd Beauty of the
a 3 Sun.

Sun. *The Universal Usefulness and Benefit of it. Its Vast Dimensions. The transcendent Swiftneſs of its Motion. Its Regular Courſe through the Heavens. Where is largely diſcuſs'd the Copernican Hypotheſis concerning the Earth's Motion, and is proved to be precarious; becauſe, 1. It is groundeſd on this Unphilosophical Notion, that it is difficult and troublesom to the vaſt Heavenly Bodies to be continually journeying and poſting, and therefore the Copernicans would free them of this great Trouble by laying it upon the Earth, which they fancy can bear it better. 2. It confronts that Hiſtorical part of the Bible, Joſ. 10. 13. Iſaiah 38. 8. In ſuch a plain Narration of Matter of Fact, and that of a Miracle, it is not to be ſuppoſed that Words are ſpokeſ any otherwiſe than according to the Real Nature of the thing, and the Propriety of Speech. 3. It proceeds upon an erroneous and miſtaken Apprehenſion concerning the Nature of the Earth, and the chief Inhabitant of it, Man: for both of them are far greater than the Heavens in real worth and value. 4. We may as well imbrace the Doctrin of Tranſubſtantiation, which is an abſolute Deſiance to our Senſes, as this Opinion. Objections and Eviſions framed from Cuſtom, and the moving in a Ship, answered. 5. If the Trembling of the Earth may be felt (as all grant) then the Violent Whirling of it about muſt needs be more ſenſible. Objections againſt this answered. Demonſtrations which depend on the Eye-ſight are fallible, and have been queſtion'd by the beſt Artiſts. The Modiſhneſs of the Copernican Notion tempts moſt Men to follow it. This is no Temptation to the Author, who for the Reaſons premiſed holds, that the Heavens continually roll about the Earth, from that effectual Impulſe which they at firſt receiv'd from the Almighty Hand.* p. 19.

THE CONTENTS.

xi

CHAP. III.

The Oblique Course of the Sun, being the Cause of the Vicissitudes of Day and Night, of Winter and Summer, which are so beneficial to Mankind, is an Argument of the Divine Care and Providence. The Powerful Influence of the Moon evidences the same. So do the Planetary Stars, and Fixed ones: which latter are eminent for their Magnitude, Number, Beauty and Order, Regular Course, Use and Influence; all which set forth the Wisdom and Goodness of the Beneficent Creator. The Study of the Stars leads us to God. Astronomy Useful. P. 51.

CHAP. IV.

The things which are remarkable in the Space between the Heavens and the Earth administer clear Proofs of a Deity; as the Air, the Winds, the Clouds, (where the late Archæologist is rebuked) the wonderful Ballancing of these latter: their gentle falling down in Rain by degrees: the Usefulness of these Showers. The Rain-bow. Thunder and Lightning. Snow, Hail, Frost and Ice. P. 74.

CHAP. V.

The Frame of the Earth argues a Godhead. A particular Account of the Torrid Zone, and of the two Temperate, and two Frigid Zones: especially the two latter are shew'd to be Testimonies of Divine Providence. The present Position of the Earth is the same that it was at first, whatever the Theorist (who confutes himself) suggests to the contrary. Against him it is proved that the Shape of the Earth at this day is not irregular and deformed; and that the Primitive Earth was not destitute of Hills and Mountains.

These are of considerable use. The particular Advantages of them are recounted, and thence the Wise Disposal of the Creator is inferr'd. P.95.

C H A P. VI.

Vegetables are next consider'd, and their Different Parts enumerated, and shew'd to be Arguments of a Divine Contriver. Their Fragrancy, Delightfulness, Beauty. Their various Natures, Kinds, Properties. Their Usefulness in respect of Food. Particular Instances of some Foreign Plants, viz. the Metla, the Cocus-tree. They are serviceable for Physick. The Signature of some of them declares their Properties, and is a Divine Impression. P.117.

C H A P. VII.

God is to be found in the Subterraneous World. Where are Waters, Fires, Metals, Minerals, to which latter belong Earths, Salts, Sulphurs, Stones both Common and Precious. The Loadstone particularly considered, and the Author's Opinion concerning it. He disapproves of the Total Dissolution of the Earth at the Deluge, and gives his Reason for it. His Judgment touching Earth-quakes and Trepidations of the Earth. He invites the Reader to reflect with great Seriousness upon the late Instance of this kind: and to that purpose offers some Remarks upon it. Which he closes with a Devout Address to Heaven, to supplicate the averting of the Manifestation of the Divine Displeasure in this kind for the future. P.137.

C H A P. VIII.

The Sea, with all its Treasures and Riches, is another Evidence of an Omnipotent and All-wise Being. The several Sentiments of Writers concerning its Ebbing

bing and Flowing are examined. The Phenomenon is resolved into a Supernatural Efficiency, and why. The Saltness of the Sea-Waters is in order to the Preserving them from Putrefaction. The Sea is kept within its Bounds by an Almighty Arm. God's Providence seen in making it both the Source and Receptacle of all Waters. The Theorist's Conceit of the Primitive Earth's being without Sea, refuted by Scripture and Reason. The great Usefulness of the Sea in several respects.

p.162.

CHAP. IX.

The Wisdom and Power of God are discern'd in the Formation of Living Creatures that are Four-footed: which are distinguish'd according to their Hoofs, or their having or not having Horns, or their Chewing or not Chewing the Cud. Their Serviceableness in respect of Food, and Work or Labour. Instances of the latter sort. Even Creeping and Groveling Animals exalt their Creator. Fishes (some of which are of a vaster Magnitude than any other kinds of Animals) shew the distinguishing Providence of God in the peculiar Structure of their Bodies, in order to the Element they live in. Fowls are purposely shaped and contrived for the particular use they were designed for. Their Food is sometimes extraordinarily provided for them: and sometimes they are supported without it. They are observable for their being Musical, for their imitating Man's Voice, for their Beautiful Colours. Birds of Prey are generally solitary. The several Incubations of these Creatures afford Matter of singular Remark. The wonderful Make and Contrivance of their Nests speaks a Divine Architect.

p.182.

CHAP.

C H A P. X.

In the Smallness of Insects is display'd the Skill of the Divine Artificer. A Fly is of a wonderful Make. The Omnipotent Deity is discernable in a Bee, and in a Silk-worm. The Ant is more largely consider'd, viz. as to its Indefatigable Industry and Sagacity: both which are celebrated by all sorts of Antient Writers. The admirable Artifice of the Spider in making and hanging her Web, and catching her Prey. A Flea is the Workmanship of Divinity. Mites have Organized Bodies.

p.202.

C H A P. XI.

It is from a Divine Author that all Animals are fashion'd and contriv'd in their Parts and Organs, in their Senses and Faculties, according to the Employment, Use and End for which they are serviceable. The Natural Propension in them to propagate their Kind is from God. So is their Sagacity. This latter is voted for Reason by some Writers; who also attribute Speech to them. It is proved that this is groundlessly asserted, and that Reason is the sole Privilege of those Beings that are capable of Religion. To those who object the Uselessness, nay Hurtfulness of several Animals, (as if this were an Argument against Providence) it is answered, 1. Though we are not able to assign the Use of some Creatures, yet it doth not follow thence that they are useless. 2. The Creatures which seem most Vile are a Foil to the rest. 3. There is some thing worthy of our Observation in every one of them. 4. Some of these are Food for others. 5. Most of them are useful to Mankind in a Medical way. The Author's Conjecture concerning the Benefit of Gnats, Fleas, Lice, Flies, Spiders. Venomous Creatures carry an Antidote with them.

6. The

6. The most hurtful Animals may be beneficial to Man as Crosses and Afflictions are, which are welcome to the Vertuous. 7. That they generally do so little Harm, when they are able to do so much, is a Manifestation of the Divine Care and Providence. 8. The Enjoyment of their Essence is from the Divine Bounty, which none ought to repine at. 9. They are made use of by God sometimes to plague notorious Offenders. Lastly, That any Creatures are Noxious, proceeds from the Sin of Man, and the Curse which followed it: wherefore we have no reason to complain of them, or to question the Goodness and Providence of God. The vast Numbers and various Kinds of Insects are some proof of their Usefulness. All Creatures are some ways Good, and made for some Use. Though we do not see their Usefulness at present, after-Ages may discover it. P.220.

C H A P. XII.

This Argument which hath been used all along in this Discourse to prove a Deity and Providence, was made use of in the Old Testament by Job, and by David in several of his Divine Hymns, (which are distinctly Commented upon): by St. Paul in the New Testament, by the Christian Writers of the succeeding Ages, by Pagan Philosophers and Poets, whose memorable Testimonies are cited. The proper Inferences from the whole are these; 1. We are obliged to own a Deity in the visible Works of the Creation. 2. We have hence Encouragement to contemplate the Creatures, and to study the Works of Nature. 3. By this Contemplation and Study we should be induced not only to acknowledg but to worship, love and obey the Omnipotent Creator, and to devote our whole Lives to his Service and Honour. P.246.

P A R T

P A R T. II.

C H A P. I.

THE Body of Man is more excellent and perfect than those of other Creatures, as to its Stature, and several of its Organs and Vessels. This singular and peculiar Workmanship is elegantly expressed in Psal. Cxxxix. 14, 15, 16. which Words are Commented upon. In the first Noble Cavity, viz. the Head, are observable, the Skull with its Sutures and its Membranes, with which it is lined; the Brain, the Face with its Forehead, Nostrils, Cheeks, Lips, Chin, Mouth, to which latter belong the Palate, Uvula, Tongue, Teeth: The wonderful Contexture, particular Use and Design of all which Parts are distinctly set forth, and shew'd to be the Effect of stupendous Wisdom.

Page 1.

C H A P. II.

The excellent Fabrick of the Ear, and the several Parts and Organs which contribute to the Sense of Hearing. The peculiar Structure of the Eyes; where a large and full Account is given of their Humours, Coats, Muscles, of the Eye-brows and Eye-lids, and the Hair belonging to both. The transcendent Usefulness and convenient Situation of this part of the Body.

p. 26.

C H A P. III.

The Neck contains two Passages or Channels of a very admirable Contrivance, viz. the Windpipe with its Larynx

THE CONTENTS.

xvii

Larynx and Epiglottis, and the Throat or Gullet. The second or middle Partition of the Body, viz. the Breast, is also shewed to be the Product of an omnipotent and intelligent Operator. The particular Use and Serviceableness of the Lungs, and the peculiar Composure of them in order to this. The proper Office of the Heart. Its Vessels for conveying of Blood. The Circulation of this noble Liquor. The Swiftneſs of its Motion. The Situation of the Heart. The useful Membrane which encloses it. The several Uses of the Diaphragm. P. 42.

CHAP. IV.

The Frame of the third and lowest Region of the Body speaks a Divine Artist. The convenient Position of the Stomach. Its wonderful Operation in the Concocting of Food. The diverse Opinions of Writers concerning the Cause of it. The Author's particular Sentiment. An Account of the Intestines, and of the proper Uses of them. The several Passages and Conveyances of the Chyle. The distinct Offices of the Liver, Spleen, Pancreas. How this Lower Partition of the Body is guarded and secured. The mutual and necessary Correspondence of the Brain, Heart and Stomach, which are the principal Contents of the three Regions of the Body. How by the Nerves and Animal Spirits convey'd in them, all Motion and Sensation are performed in Humane Bodies. P. 58.

CHAP. V.

The several Kinds of Flesh, and how exactly fitted and placed in the Body according to their several Uses and Purposes. Why the hinder part of the Cranium is so strong and thick. The admirable Conformation and Contrivance of the Vertebra of the Neck and Back.

The

The particular Structure of the Hip-bones. The Nature and Use of the Ribs. How smiting under the fifth Rib, 2 Sam. 2. 23. is to be understood. The peculiar Configuration of the Bones of the Hands. The general Use of the Bones, together with the Marrow, of the whole Body. They are numerous. The Nature and Serviceableness of the Gristles. A distinct Enumeration of the several Sinks and Dreins which are made to carry off excrementitious Humours. What is the immediate Matter of the Seed. What of the Milk. The Author interposes his Opinion. The Lymphatick Vessels. The Pores of the Skin. p.81.

C H A P. VI.

The wonderful Formation of the Foetus in the Womb is an irrefragable Argument of the Divine Wisdom and Power. It is so acknowledg'd by David, Solomon, Hippocrates, Harvey, Glisson. Whether the Child all the time of its close Confinement be nourish'd with Blood, or Chyle, by the Navel or by the Mouth. As its living in the Womb, so its safe coming forth thence is the Effect of a Divine Conduct and Providence. The Secret Parts are Proofs of a Wise and Intelligent Creator. A Reflection on the whole. The Body of Man a Temple. The great Variety of Workmanship in this Structure. St. Paul speaks like a Natural Philosopher. Every thing in Humane Bodies shews wise Forecast and Design. Though some of the Hypotheses proceeded on in this part of the Discourse should prove faulty, yet the very Things themselves will always remain Arguments of the Divine Wisdom, Power and Goodness. The exact Symmetry of Man's Body proved by several Learned Writers. The Exquisiteness of this Fabrick is made use of as an Argument for the Demonstration of a Deity by David, Job (whose observable

servable Words are paraphras'd upon), *Isaiah, the Great Apostle, the Christian Fathers, Learned Jews, Gentile Philosophers and Physitians, several of the Moderns, as Bartholine, Diemerbroek, Harvey, Glisson, Willis, Lower, Boyl, Ray.* p.107.

C H A P. VII.

An Apology for Physicians: wherein there is given an Account why they commonly lie under the Imputation of Irreligion and Atheism; viz. 1. From a Vulgar Prejudice which hath prevail'd in the World, and that among Gentiles, Jews, Christians. It had its first rise from that Averseness which was justly shew'd to those who were only Pretenders to the Art, and abused this Noble Profession. 2. This Prejudice is partly nourish'd by the particular Deportment of the Persons of this Faculty when they visit their Patients. 3. It may perhaps be increas'd by observing how seldom (in respect of some others) they appear in places of Publick Devotion. 4. It may be occasion'd by their Promiscuous Converse. 5. They may by some be thought to have no Religion because they have so much Philosophy. As for such of this Faculty as really favour Atheism in their Speeches and Practices, this is not to be imputed to their particular Art and Calling, for there are some very bad Men of all Professions. There are some footsteps of Religion in the Prescriptions of Physitians. Galen was in his way Devout. Modern Physitians have been Illustrious Examples of Christian Piety and Devotion, and great Assertors and Patrons of our Holy Religion. A Physitian as such is disposed to be a Wise and Good Man. p.133.

A DEMONSTRATION
OF THE
Existence and Providence of God,
FROM THE
Contemplation of the *Greater World.*

C H A P. I.

The Argument of the following Discourse is suted to the Genius of those for whom it is chiefly designed. God's Being and Providence are proved in General. 1. From the Harmony and Connexion of the Things in the World. Where is shew'd wherein this Harmony consists, and how the Notion of Chance is baffled by it. 2. From their Excellent End and Designs, the chief of which is to be serviceable to Man. Both Animate and Inanimate Creatures conspire in this, being actuated by a Divine Director and Disposer. This ruins Monsieur Des Cartes's Opinion, whereby he attempts the solving of all Things by Mechanick Principles. This also confounds his denial of Final Causes in Natural Philosophy.

IT is certainly a great Proof of the Catholick Degeneracy of this present Age, that the Minds of Men are generally averſe to Religion and Vertue: but it is yet a greater Evidence of this degenerate and vile Temper, that ſuch Numbers of them are backward to acknowledg the Divine Being Himſelf, and his Wiſe Contriving and Managing of all things. Many Arguments have been made uſe of to baffle this groſs piece of Impious Folly, but ſtill we find it is Rampant in the World. Many Antidotes have been preſcribed to expel this Poiſon, but yet we ſee it is not rooted out, yea in ſome Places it grows more raging and infectious. Even thoſe who pretend to be the greateſt Maſters of Reason induſtriouſly propagate this Contagion: that is as much as to ſay, the Men of *Wit* confront and deny what all the *Wiſe* Heads in the World have acknowledged. Theſe latter, whileſt they have been ſearching into the Works of Nature, have been directly led to a Deity. For, as an Excellent Perſon ſaith, * *By the Greatneſs and Beauty of the Creatures, proportionably the Maker of them is ſeen.* The Works of the Creation ſhew us the Creator Himſelf. Theſe are Nature's Bible, wherein we plainly read a God. Which
occa-

* Wiſd. 13. 5.

occasion'd *Plotinus* to say, If the World could speak, and we could hear its Voice, it would certainly utter these Words, *God made me.* This is the Subject of our present Undertaking. And I make choice of this Argument before all others, because it is one of the most Sensible nature, and therefore is fittest to be used when we deal with those that are governed by Sense and outward Impressions only: This is an Argument that they can feel and see, and have a bodily apprehension of, and therefore there may be *some* Hopes of working upon them by it. The Wisdom and Power of God are legible in the admirable Structure of the Universe. All created Things bear the manifest Signatures of a Deity. The Existence of a Divine *Numen* may be inferr'd from the Fabrick and Contrivance of the World, and all the Parts of it.

This is that grand Truth which I will insist upon: And, 1. More *Generally*, and at large, I will prove that the Creation and Make of the World forcibly argue a God. 2. I will instance in the *Particular* Works of the Creation.

First, To speak of the Works of the Creation in general, they are Arguments of a Deity and a most wise Disposer of all Things, because, 1. They are so Exact and Harmonious. 2. It appears that they are design'd to some excellent Ends and Purposes

First, We cannot but take notice of and admire their *Exactness* and *Harmony*. * The Works of God, saith the excellent *Philo*, are so accurate that they cannot possibly be found fault with, reprov'd or amended, because they are framed with the most consummate Skill and Art. This marvellous Art and Wisdom in the Make of every Creature, (even the least and meanest) in the Proportion, Beauty, Distinction, and yet Fitness of their Parts and Organs, are so plain and evident that they cannot possibly escape our Observation. This was the meaning of *Plato's* Saying, that *God doth always act the Geometrician*, that is, in all his Works he keeps an exact Proportion and Harmony. Scan well the nature of Things in the Universe, and you will see that there is a due Correspondence of one Thing with another; all things are fit, futable and agreeable: there is a convenient and regular Subordination of one to another. The Clouds are naturally in a Propension to fall upon the Earth and moisten it, and the Earth naturally stands in need of these Clouds, and cannot bring forth its Fruits without their Assistance; and therefore in time of Drought it seems with open Mouth to call as 'twere for the Rain of Heaven, and afterwards it gratefully returns it

* Ἀμώμητα καὶ ἀνεξέλεγκτα, καὶ ἀνεπανόρθωτα τὰ Θεοῦ ἔργα, τελειοτάτῃ τέχνῃ καὶ ἐπιστῇ δημιουργηθέντα. Περὶ κοσμογενείας.

it in Vapours and Exhalations for the producing of Clouds again : These Clouds and this Earth, with their Rain and Fruits, are absolutely necessary for the use of Man and Beast, as appears from their impatient craving of these Benefits when they are deprived of them. Thus God is said *to hear the Heavens*, and *they to hear the Earth*, and *the Earth to hear the Corn, Wine and Oil*, and *they to hear his People*, Hof. 2. 21, 22. It fully, but briefly, expresses the *Mutual Agreement* of the Works of the Creation among themselves, and the Dependence of them all upon the Supreme Being. So the Difference of Sexes, or the Constitution and Make of Male and Female in all Living Creatures, shews that they have a respect to one another, that there is a Relative Tie and Connexion among them, *viz.* in order to the preserving of the Kind, and increasing the Number of them. (Whence by the way we may infer that the *Arabian Bird* which the Poets talk of, of which Sort they say there never is but one, is a Fiction, for Nature designed the Propagation of the Species.) And in almost innumerable other Instances it might be shew'd that there is this *Natural Dependance* of one Thing upon another : Wheresoever we look we may espy this. Hence we find that those profound Sages *Pythagoras* and *Plato* frequently inculcate that all things are *Linked together* ; there is an

Affinity among Beings in the World: All Things in Nature are a-kin to one another. And this *Heraclitus* meant when he said after his obscure manner, ἑκ πάντων ἓν, καὶ ὅξ ἐνὸς πάντῃα, *i.e.* one and all things in the World have a mutual Dependence, they are like the Body and the Members: Their Perfection consists in their Relation to and Connexion with one another. This the Royal Philosopher often suggests, that the World is of *one piece*. * *All Things are tied together as 'twere by a Sacred Tie and Bond, so that nothing is a Stranger to another: They are all coordinate, and adorn and beautify the same World.* Now this wonderful Sympathy and Cognation, this Pulchritude and Consent of Things cannot be without an Eternal Mind. This Excellent Order and Harmony of the World argue a Supream Director. † The Workman is known from the Work it self, as *Philo* saith rightly; from the Make of the World you may gather the Author of it: For (as he adds) no Exact and Artificial Work is of Self-production. Wherefore from the Admirable Artifice of the World's Composition, we may conclude that it was not from Chance, not from a temerarious (but lucky) hit of Atoms. What

* Πάντῃα ἀλλήλοις ἐπιπλέκτεται, καὶ ἡ σύνδεσις ἱερὰ, καὶ χάρις πρὸς ἀλλήλους ἄλλο ἄλλω· συγκατατέτακται γὰρ καὶ συγκοσμεῖ τὸ αὐτὸν κόσμον. Antonin. † Ἀὐτὸ γινώσκοντα τῶν δημιουργῶν ποικίλῃ ἐστὶν τὰ δημιουργηθέντα. ἐστὶν γὰρ τὰ τεχνικὰ ἔργα ἀπαντρεῖσθαι τεχνικῶς, ὅς ὁ κόσμος. De Monarchiâ.

What Beautiful and Stately Palace was ever known to be rais'd by Chance; and how then can this Massy Fabrick, this great Amphitheater of the World be thought to have no other Rise? Which very Argument *Plutarch* long since used to baffle those Mens fond Conceits who talk'd of *Fortune* in this Case. * Nothing, saith he, that is Fair and Goodly hath a fortuitous Original, but is wrought by some Art. He that sees an excellent Clock or Watch, made of so many Wheels, &c. shewing the Hour of the Day, and observes the orderly Motion of it, will not say it was thus framed by *Chance*: How then can he have the Face to say that the *Sun* which rules this Artificial Work is a Casual Product? Yea, how can he be so impudent as to say that *Man* himself was but a By-blow? Shall an Inanimate Machine be extoll'd as the effect of Art and Invention, and yet shall the Artificer himself be voted to be from no such Principle? Surely Men of Sense and Brains cannot but blush at such absurd Propositions. It was incomparably spoken of *Maximus Tyrius*, † Be perswaded (saith he) that this Universe is the Harmony of a Musical Instrument, and that the Artificer of it is no other than God.

B 4

Though

* Οὐδὲν γὰρ καλὸν εἶη καὶ ὡς ἔτυχε γίνεσθαι, ἀλλὰ μετὰ τινος τέχνης δημιουργήσεως. De Placit. Philosoph. † Ἦγάρ τὸ πᾶν τῷ τοῦ ἀρμονίας πινὰ εἶναι ὁργανοῦ μεσικῆς, καὶ τεχνίτου μὲν τὸ εἶναι. Dissertat. 3.

8 *God's Being, &c. prov'd*

Though we should grant the World to have been Eternal, yet it is impossible that that immense and eternal Matter should dispose it self into such beautiful Order without some Intelligent Substance and Contriver. And therefore those who are of Opinion that *Aristotle* held the World to be Eternal, yet confess that he acknowledg'd it to be from God, and not by Chance. For it is unspeakably absurd and ridiculous to say that meer Matter fell into this excellent Frame we behold it in, and not from a knowing and designing Principle; for Casualty is without Order, Rule or Certainty: Therefore the Fabrick of the World must be from the Wisdom of some Omnipotent Creator, or else we can give no account of the Order and Graceful Disposition of Things, and of the Harmony of the World, which (as * *Seneca* saith truly) consists of discording and contrary Qualities. To this purpose an antient *Christian* Writer, speaking concerning God, hath these Words, † He hath most fitly adorned the Universe, and hath reduced the Discord of Elements into Order and Concord, that the whole World might be Harmonious. And the Permanency of this excellent Order shews its Author: Where-

* Tota hujus mundi concordia ex discordibus constat. *Nat. Quest. l. 7.* † Τὸ το πᾶν ἐκόσμησεν ἁρμονίᾳ, &c. *Clem. Alex. Admonit. ad Gentes.*

Wherefore to that Question, * *Whence doth it appear that there is a God?* Justin Martyr gives this Answer, *From the Consistency and lasting Order of Things in the World.* The Laws and Course of it have remained regular and constant for so many Ages: the Effects are steady, methodical, and unalterable. This is that admirable † *Consequence and Proportion* (as Philo calls it) which we may observe to be in all Things, whereby they are indissolubly chain'd together, and continue with an uninterrupted Series. The only account that can be given of this, is what the same Author saith, || The Eternal Law of the Eternal God is the most firm and stable Basis of the World, and all Things in it. Thus the Works of the Creation are a proof of the Deity; their durable Harmony evince a God. Chance could not effect all these great and wondrous Things, it could not produce such a Glorious Fabrick, neither can it uphold and sustain it: Wherefore we may infer that there is an Omniscient Creator, a Wise Artificer.

Secondly, As the *Admirable Order*, so the *Excellent End and Design* of the Works of the Creation demonstrate the Being of a God.

Not

* Πόθεν δῆλον ἐὶ ὅλως ἐστὶ Θεὸς; Ἐκ τῆς ὁμολογίας συστάσεώς τε καὶ διαμονῆς. Quæst. & Resp. † Ἀκολουθία καὶ Ἀναλογία ἐν τοῖς συμπάντων εἰρημὸν ἔχουσα ἀδιάλυτον. || Νόμος ὃς ὁ αἰδίου Θεοῦ τὰ αἰώνια τὸ ὁχρῶται καὶ βεβαιότατον ἔρεσμα τῶν ὅλων ἐστὶ. De Plantat. Noë.

Not only Men and Angels, which are the Flower of the Creation, act for some End; but all other Creatures of a lower Rank may be said to do so likewise: Even Things that are Inanimate and void of Sense act for some Purpose. The Sun warms, and the Clouds moisten the Earth, but not for themselves; and the Earth thus warmed and moistened produces Herbs and Fruits, but not for it self, but for the several Animals which inhabit on it, *Man* especially who rules over them. But this will not go down with some, particularly the *Theorist*: * *To say (saith he) that the World was made for the sake of Man is absurd, and better deserves to be censured for an Heresy in Religion, than many Opinions that have been censured for such.* And then in order to this he degrades and defames *Man* in a most scandalous manner, (as if he were no Sharer in Humane Nature himself) he makes him a very paultry Creature, a poor sorry Scrub; and then at last he cries out (I wish he had forborn) *Is this the great Creature which God hath made by the Might of his Power, and for the Honour of his Majesty, (thus comparing the Almighty to Nebuchadnezzar) upon whom all Things must wait, to whom all Things must be subservient?* I delight not in quoting such Passages as these, but there is a kind of necessity

* *Theory of the Earth, Book 2. chap. 11.*

sity of doing so, that Mens Minds may not be corrupted and debauch'd by such ill Language, which I hope may be in part prevented by my cautioning against it.

And here, by the way, seeing I now have, and shall frequently afterwards have occasion to mention some Opinions of this Ingenious Gentleman, and to argue against them; I do here once for all declare that nothing of this Nature is done by me from a Principle of Contradiction, or a delight to oppose this or any other Author's Assertions. No : I most solemnly profess and acknowledg that I bear a due regard to the Wit and Invention of his Hypotheses, which are very diverting and entertaining. But because I am verily perswaded that they are defective as to Truth, I on that account offer a Refutation of them. But I would not be thought to say any thing out of pique, or so much as an Inclination to reflect with Contempt or Disgrace on any Man's Person or Undertakings, and particularly those of the Ingenious and Learned *Theorist*. It is wholly from a just and deep sense of their opposition to that great Standard of Truth in this kind, *viz. Moses's Writings*, that I appear against them. And I think it is a good and justifiable Employment to assert and defend the *Mosaick Verity* : and whilst I am about this Work, I reckon I am in an Honourable Post.

That

That the World is made for *Man*, is no such daring Proposition as some pretend it is. The Heavens above him, and the Earth beneath him, are for his Sake. Even those former, the Heavenly Bodies, are made for him, or else you can never make Sense of the Psalmist's Words, Psal. 8. 3, 4. *When I consider thy Heavens, the Work of thy Fingers, the Moon and Stars which thou hast ordained, then I say, What is Man that thou art mindful of him, and the Son of Man that thou visitest him?* Whence it is evident that these glorious Creatures (so bright, so beautiful, so remarkable) were created and provided for the use and benefit of *Man*, and that God sheweth how *mindful* he is of him, and how he delights to *visit* him, *i. e.* to discover an extraordinary Kindness to him above all other Creatures, by providing the World and all Things in it for him. It is true, the *Heavens* are made for the *Angels* as well as *Man*; but yet we know that even these excellent Beings (though they be of a higher Nature than he) are *Ministring Spirits*, and employed for the good of *Mankind*, especially of the choicest part of them, the Heirs of Salvation. So that not only the Heavens, but the Inhabitants thereof are for *Man's* sake. But it is enough for my present purpose that the Sublunary World, and the Heavens (of which we are to treat) serve *Man*, and were made for him. This the
Stoicks

Stoicks were great Assertors of ; and particularly * *Tully*, who was a Friend to that grave Sect, defends it. Man is as it were the Center of the World in respect of Final Causes, saith a † profound Philosopher of our own. And though this be denied by *Des Cartes*, and some of late, (who would pretend to imitate him in that as well as in some other Things) yet till there be assigned better Arguments for their Opinion than we hitherto find, we have reason to hold fast our Proposition, that the World was made for the Sake of Man. Even Inanimate Creatures are accommodated to his use and service, and the whole Creation some way or other is for his Good.

Yet it is certain that they have no Knowledge or Foresight, no Consultation or Deliberation, and consequently can understand nothing of this End which they are made and continually act for. Wherefore we must necessarily grant that there is an Omniscient Principle that acts them, there is a wise and understanding Being that directs and governs them. It must be ascribed to this, and this alone, that irrational and dumb Creatures, yea such as have no sensitive Perception, act so orderly, and with a tendency to an End : And this they do not seldom, but constantly and perpe-

* *De nat. Deor.* lib. 2. & lib. de Officiis. † *Lord Bacon*, *Wisdom of the Antients*.

perpetually. We see and observe that there is an uninterrupted Course of the Sun and Moon, and other Heavenly Bodies in order to our Welfare, which could not possibly be procured without them: And we see and are convinced that other Senseless Creatures are directed to an End, and miss it not: All Natural Agents (of what kind soever) have a regular and fixed Tendency to what is profitable for the Universe. The short is, any Man that is not wilfully blind may see that there is *Design* and *Contrivance* in the World's Creation, and in all the Parts of it, and that there is an *End* pursued even by those Beings which have no Sense or Reason: Whence we cannot but conclude that seeing these are void of all Counsel, and consequently do not act thus by any Counsel of their own; therefore they do it by another's. There is some Intelligent Agent and Principle, there is some wise overruling Cause that directs and governs them, and purposely produced them for such Ends and Uses. Will not any understanding and considerate Man grant that this Director and Governour is *God*; who as he is the Ruler, so was the Author and Architect of the World? It was he that first endued them with such a Nature and Instinct, whereby they tend to their particular Good and End, and also to the universal Good of the World. Yea, those things which are contrary to one another, conspire

pire in one common End. We must be forced to give our Suffrage to what one of the Antients said, There is a God, * who hath commodiously framed and ordered all the Parts of the Universe for the advantage of the Whole: As they have their Existence from him, so they are actuated by him. And it is utterly impossible to conceive that they can be able to act as they do, *i. e.* for certain Ends and Purposes, unless there were an higher Agent to direct them. The End and Contrivance of things undeniably prove the Divinity, and confute blind *Chance* and *Fortune*, yea and *Necessity* too; which latter is held by *Spinoza*, and accordingly † he asserts that God himself hath no certain End or Design in what he doth.

Thus whether you respect the Order and Beauty of the Creatures, or the End and Design of them, it is evident that they are Arguments of a Deity. The whole Frame of Nature cries out that there is a God: All the Creatures confess that they are not of themselves, but from an Other. In vain hath the *French Philosopher* attempted to prove that we may give an account of all the Phænomena of the visible World from Matter and meer Mechanical

* Πάντα τὰ μέρη τῆς κτίσεως χειρῶς πρὸς λυσιτέλειαν ἡ ὅλης ὑποστηρίμματα. Just. Mart. Quæst. & Resp. ad Græc. † Append. ad part. 1. Ech.

chanical Motion. I say, in vain was this Attempt made, though I deny not that the Noble Author of it hath shewed a great deal of Wit and Art in the Prosecution of it, and hath said more than any other Man ever did, or perhaps could in Defence of this Hypothesis. But any Impartial Judg that hath perused what the Learned* Dr. *More* hath offer'd against it, will pronounce it to be a vain Enterprize, and indeed utterly Unphilosophical. He hath demonstrated that there is not any necessary Causality in *Matter*, whereby such Effects are produced, that there is no such immutable Law implanted in it, no such original and independent Power, but that it is derived wholly from a higher Principle. By sundry Arguments he irrefragably baffles the Notion of solving all Things by Mechanick Principles, but by no Topick more effectually than that which I have propounded, *viz.* the *wise Contrivances* in the Works of Nature. Mere Motion is no Designer, no Contriver, therefore it can't be the Cause of those Things which we daily see. We must then rationally as well as necessarily infer an All-wise Being from the Operations of the Creatures, for we see that they are directed to some End.

And as to what *Des Cartes* saith, that the *Ends* of the creating of things are not known
to

* Opera Philosoph.

to us unless God be pleased to reveal them, I refer the Reader to the * Honourable Mr. *Boyl*, who hath professedly writ against this Doctrine, and hath with undeniable Demonstrations confounded it; that is, he hath most clearly and convincingly shew'd that the Ends and Designs of God in the Works of the Creation are manifestly known, and in abundant Instances he shews that they are most obvious and apparent. He denies not that in *some* of God's Works the Ends designed are somewhat obscure, and seem to be beyond our reach; but then it is as true that in *most* of them the Ends and Uses are manifest, and the exquisite fitness of the Means is conspicuous. " And " (as he observes) by this way of ordering " and managing Things, the most wise Au- " thor of them doth both gratify our Under- " standings, and make us sensible at the same " time of the Imperfection of them. In- deed this must be said, that *Cartesius*'s Opini- on, *viz.* that the Consideration of Final Cau- ses, hath nothing to do in Philosophy, is consistent enough with his own Principles: for, if all that we see in the Bodies of Animals, and elsewhere in the World, be merely Me- chanical, then there is no Contrivance, no Art, because he holds all to be the natural Result of Matter; and consequently there is

C

no

* *Essay concerning the Notion of Nature.*

no *End*, and (which follows from that) there is no Signature of Divine Wisdom in the framing of them. But this Conceit of his of *Mechanism* hath been justly exploded by all the great Masters of Reason who have handled this Subject; and the excellent Person before-named hath for ever silenc'd that Opinion, if Convictive Arguments can silence it. Therefore *Des Cartes's* denial of *Final Causes* falls to the Ground, because it hath nothing to support it now since that Foundation is removed. Mr. *Boyl* hath observed well (not only like a Philosopher but a Christian) that this *French Wit*, by his throwing aside *Final Causes*, hath thereby deprived his Disciples of the chief End of Natural Philosophy, which is to set forth the Praises of God, and to admire his Goodness and Wisdom in the Fabrick of the Universe. But if we will truly Philosophize, we must by no means shut out the Consideration of the *Ends* of the Creation, but we must with great diligence and study enquire into them, and acquaint our selves with them: And then by seeing and observing the World we shall learn to know a God, we shall be brought to acknowledg and adore an infinitely wise Author who appointed all things their Ends, as well as gave them their Beginning.

And now having thus spoken in *General*, I will descend to *Particulars*, and consider the whole

whole visible Structure and System of the World as to its several Parts. Here we will contemplate, 1. *The Heavens.* 2. *Those things which are observable between the Heavens and the Earth.* 3. *The Earth.* 4. *The Sea.* 5. *The Inhabitants that belong to these several Regions, Aerial, Terrestrial, Aquatile.* All these proclaim a God, an Omnipotent Supream Being, a Wise and Provident Governour.

C H A P. II.

*The Author proceeds to a Particular Proof of the Divine Existence and Providence from the Consideration of the Heavenly Bodies. The unrivall'd Beauty of the Sun. The Universal Usefulness and Benefit of it. Its vast Dimensions. The transcendent Swiftneſs of its Motion. Its Regular Course through the Heavens. Where is largely diſcuſs'd the Copernican Hypotheſis concerning the Earth's Motion, and is proved to be precarious; be-
cause, 1. It is groundſed on this Unphilosophical Notion, that it is difficult and troublesome to the vaſt Heavenly Bodies to be continually journeying and poſting, and therefore the Copernicans would free them of this great Trouble, by laying it upon the Earth, which they fancy can bear it better. 2. It confronts that Hiſtorical part of the Bible, Joſ. 10. 13.*

Iſa. 38. 8. In ſuch a plain Narration of Matter of Fact, and that of a Miracle, it is not to be ſuppoſed that Words are ſpoken any otherwiſe than according to the real Nature of the Thing, and the Propriety of Speech.

3. It proceeds upon an erroneous and miſtaken Apprehenſion concerning the Nature of the Earth, and the chief Inhabitant of it, Man: For both of them are far greater than the Heavens in real worth and value. 4. We may as well imbrace the Doctrine of Tranſubſtantiation, which is an abſolute Deſiance to our Senses, as this Opinion. Objections and Eviſions framed from Cuſtom, and the moving in a Ship answered. 5. If the Trembling of the Earth may be felt (as all grant) then the violent Whirling of it about muſt needs be more ſenſible. Objections againſt this answered. Demonſtrations which depend on the Eye-ſight are fallible, and have been queſtioned by the beſt Artists. The Modithneſs of the Copernican Notion tempts moſt Men to follow it. This is no Temptation to the Author, who, for the Reaſons premiſed, holds that the Heavens continually roll about the Earth, from that effectual Impulſe which they at firſt received from the Almighty Hand.

I Begin with the Heavens, that immense Space where the Sun and Stars are placed, that vaſt *Expansum* which contains the Great
and

and Glorious Luminaries of the World (for I speak not any thing of *Angels*, the Blessed Inhabitants of this upper part of the Creation; as afterwards when I shall treat of *Man* I shall say nothing of his *Soul*, because I have design'd to discourse only of the visible World.) These *Heavens declare the Glory of God, and the Firmament sheweth his handy-work*, Psal. 19. 1. they tell aloud who was their Author, even the same who is the Infinite and Bountiful Source of all Things. He framed this *Molten Looking-Glass* (Job 37. 18.) this Solid and Bright Mirrour of his own Majesty, that we might *behold* Him and his Perfections in it. And yet *He stretched out the Heavens like a Curtain*, (Psal. 104. 2.) as a Vail to shrowd as it were the amazing Excellency of the Divine Glory from Mortal Eyes, although from thence he distributes all the Tokens of his Liberality and Kindness to us. There is nothing more evident than that the Heavenly Bodies were made for the good of Mankind, *i. e.* to influence on the Earth, to shine, to give Rain from the Clouds, to yield Heat and Moisture, &c. Which is expressed by their *hearing the Earth*, in that fore-mentioned Place *Hos. 2. 21.* where God is likewise said to *hear them*; for they do as it were by their natural Frame and Disposition *desire* of God to be beneficial to the Earth, and the Inhabitants of it. And he doth *hear* (or as 'tis in the Hebrew)

C 3

brew) *answer*, and fulfil the natural Inclinations of these Celestial Bodies, which have a tendency to Man's Good and Advantage. And that the End and Use of them is to be serviceable to Mankind, is clear from the first Institution and Appointment of them: *God made two great Lights, the greater Light to rule the Day, the lesser Light to rule the Night: He made the Stars also*, Gen. 1. 16. viz. to rule the Night. And what can we imagine this Government of Day and Night to be for but to serve the Necessities of Man?

Of these Celestial Bodies I will speak particularly, and first of the *Sun*, that great and vast Source of Light, that glorious Eye of the World which penetrates into the darkest Recesses on Earth, and lays them open and visible: Though such is its Sovereign Majesty that it will let nothing be seen in the Heavens but It self, it blots out all the Stars with its redundant and unrivall'd Lustre; yea, such is its radiant Glory that it will not suffer us to gaze upon it. That which is the Cause of seeing all things, will scarcely be look'd upon it self. This is the *Prince of the Heavenly Luminaries*, as * *Arnobius* speaks, *by whom all Things are array'd and deck'd with the Robes of Light*. This is emphatically call'd † *the Light*, or *the Fire*, (for *Ur* signifies both) because it not only

* Sol fiderum princeps, cujus luce omnia vestiuntur. Adv. Gent. l. 1. c. 18. † Job 31. 26. & 36. 32.

only illuminates but warms the World with its powerful Rays. Unto the former Quality we are beholden for our Ability to see how to dispatch our Business and Work. Our Bodily Eyes would be useless without this of the World, for they would serve us to no purpose of Life: And the whole Earth would be but one dark Dungeon. And it is not only for Necessity but Pleasure that this Light is given us, for to it we owe the several beautiful Colours which ravish our Sight, for these are the various Modifications of its Light and Splendour. From the latter Quality with which this glorious Body is endued, the Earth receives all its Fecundity and Fruitfulness, and all Animals their Vigour and Activity. For the Sun is the grand Cherisher of all Things, the Common Parent of Life, the Foster-Father of the World. Because of this transcendent Excellency the Pagans ascribed Divine Nature to it. Yea, others (both *Jews* and *Christians*) though they went not so high, yet were of Opinion that the Sun is an Intelligent Being. This was the Apprehension of * *Maimonides*, and of † *Manasseh ben Israel*: And ‖ *Origen* long before these held the same. Which Extravagancy we can attribute to nothing but their very high Esteem which they had of this glorious and beneficial Gift of the Creator.

C 4

Next

* More Nevoch. l. 3. c. 29. † Problem. de Creatione.
‖ Cont. Cels. l. 5.

Next to its Beauty and Usefulness we might consider its stupendous *Magnitude*, which calls for our Admiration, and commands us at the same time to admire with a most profound reverence the Divine Immensity from whence it had its Original. It is some thousand times greater than the Moon; and a hundred and forty, others say a hundred and sixty, others say eightscore and odd times bigger than the Earth, (for the Opinions of Authors are different about the Dimensions not only of the Sun, but of the Moon, Stars, and Earth, their Computations varying because their Hypotheses of the Heavenly System and the Distances of these Bodies from one another are disagreeing;) but 'tis acknowledged by all that the Body of the Sun is of a wonderfully vast Bigness; they all agree that it is much *above* a hundred times larger than the whole Earth, and they unanimously reject and explode *Epicurus* and that Philosopher of the *Italian* Sect, * who held the Sun is no bigger than it appears to us to be.

Again, the admirable *Motion* and *Course* of this glorious Luminary require and deserve our Contemplation: And here we shall plainly observe the Footsteps of an Extraordinary and Divine Power. First, the *Constancy* of its Motion is matter of Admiration: Whence it

* Laert. in Epicuro & in Heraclito.

it was (as * *Plato* thought) that the Heavenly Bodies, and this more especially, were call'd *θεοὶ*, as if their never-failing Course argued them to be Divine. And it appears from † *Macrobius* likewise that they had that Denomination from their incessant Running; as if this were a stamp and impress of Divinity. Secondly, not only the *Perpetuity* of the Sun's Motion, but the *Swiftnefs* of it is remarkable, which is very elegantly express'd to us by the inspired Poet, *Psal.* 19. 5. *He rejoiceth as a strong Man to run a Race*, he resembles some celebrated *Athletick* that is famous for his Nimbleness of Feet, and always outruns those whom he strives with, and wins the Prize from them. This Celestial Racer, as the skilfullest Mathematicians inform us, runs 15 Degrees in an Hour; and seeing a Degree in the Heavens is 15 German Miles, *i. e.* 60 Italian or English ones, we may infer that he measures about 1000 Miles in an Hour. Though this Illustrious Body be of that huge Bulk and Magnitude which I before mentioned, yet this is its marvellous Speed and Career. Because of this great Celerity *Wings* are attributed to the *Sun*, *Mal.* 4. 2. (but applied in a Spiritual manner to the *Sun of Righteousness*) he *flies* rather than *runs*. And in
allu-

* In *Cratyl.* † *Θεοὶ* dicunt sidera *ὅτι τὰ θεοὶ* id est *ἰστέχων*, quod semper in cursu sint. *Saturn.* l. 1. c. 23.

allusion to this is the Psalmist's Expression, *If I take the Wings of the Morning*, Psal. 139. 9. *i.e.* if I make as much haste as the Sun doth when it sets out in the Morning, and flies from the East to the West in a few Hours; or if I hasten as fast as the Sun-beams do when at its rising they spread themselves over the Horizon. The Rapid Motion of the Sun, the swift and sudden passage of its Light are its *Wings*. The like manner of Expression is used by *Lycophron*, who speaking of Ἥως *Aurora*, attributes *Pegasus's Wings* to it,

κραίπνοις ἰωεραπετότο Πηγάσος ὠτεροῖς,

It flew over a certain Promontory with the swift Wings of Pegasus. And for this reason perhaps *Pegasus* is said by the Greeks to be the *Son of Aurora*.

But, *Thirdly*, The *Regularity* of the *Sun's Motion* is that which I shall chiefly insist upon, and thence demonstrate that there is a higher Cause and Author that gave it this orderly Progress. As it hath a Monthly Motion through a twelfth part of the Zodiack, and passes through the whole every Year; so it every Day runs about the Earth. Though I know according to some late Philosophers this Globe of the Earth is daily moved about its own Axis, as well as yearly through the Zodiack. These Men have taken pity of this part of the World which was thrust into the
Center

Center of it, and have set it up higher. And the Sun, as if it were some malicious Spy and Betrayer of Secrets, is detruded by them into the lowest part of the World, the Earth's former place. And accordingly they tell us that the Earth turning round its own Axis in 24 Hours from West to East, makes Day and Night; Day in that part which being turn'd toward the Sun it receives the Rays thereof, Night in that part which is turn'd from the Sun. And the Earth, besides this *Diurnal* Motion, hath an *Annual* one, they say; that is, in 12 Months time it goes round about the Sun: and hereby it is that the Sun seems to be joined with or opposed to such and such Stars. But though I dislike no modest and sober Assertions of Philosophick Heads, and I reject no *Hypothesis* merely because it is *New*, (though I must needs say that *Pythagoras* and one or two more of the *Antient* Philosophers speak as if they had believ'd such a thing) yet I find little reason to embrace this, notwithstanding *Copernicus* hath so many Disciples of late; yea though * *Jacob Behmen* (that this piece of Philosophy might be even *Jure Divino*) tells us that he received the Doctrine of the Earth's turning round from the Spirit by Revelation. I do not lay any stress (as some I find have done) on such Passages of Scripture

* *In his Aurora.*

ture as that in *Psal.* 104. 5. *He laid the Foundations of the Earth, that it should not be moved for ever*, and other Places which have Expressions that denote the Stability and Fixedness of the Earth (though I must needs say we ought to have regard to the very Phraseology of the Holy Writings.) There is no absolute proof from these Texts, no more than there is on the other side for the Rotation of the Earth, from such places of Scripture that mention the *moving of the Earth*, or from the Etymology of the Hebrew word *Eretz Terra*, which some derive from *rutz currere*. To which might be opposed the Derivation of *Vesta*, which is one of the Names of the *Earth*,

* *Stat vi Terra suâ ; vi stando Vesta vocatur.*

The *Earth* (which is the same with *Vesta*) hath its Denomination from its *standing*: Which by the way shews what was the Sentiment of the *Antients* concerning this matter; they verily thought and believ'd that the *Earth* stands still. But, to pass this by, I am induced to disbelieve the Circular Motion of the *Earth* after the rate that the *Copernicans* assert it, for these following Reasons.

1. This supposes the Sun and the other Heavenly Bodies to be without Motion, or to have a very inconsiderable one: For the grand Reason,

* Ovid. Fast. l. 6.

Reason, you must know, why they assert the rolling about of the Earth, is because they would free those vaster Bodies of the Sun and Stars from this troublesome Motion. They would save them the labour of such long Journeyings and Postings. It is more fitting and reasonable, they say, that this Terrestrial Spot should be in perpetual Agitation than that the huge and spacious Orbs of the Sun and Stars should wheel constantly about. Yea, some of them have founded it upon a Culinary Maxim, *viz.* That the Meat which is to be roasted turns round with and upon the Spit (its Axis) before the Fire: But we do not see that the Fire turns round about the Meat. Just so the Earth turns it self round to the Sun, to roast it self, and who would expect any other thing? They are the very Words of a * great Astronomer. This is their *Kitchen-Astronomy*, and they talk more like *Cooks* than *Philosophers*. If we would speak like these latter, we must confess that this *Rest* (which they suppose) of those great *Firy Bodies* is against the very Nature of them, which is Active and Stirring, and tends to a *Circumgyration*. Therefore it is an Unphilosophical Thought to imagine that the vast Bodies of the Heavens stand still, seeing their very Nature is to be in continual Motion.

* Kepler. Epit. Astron. Copernic. l. 1.

Motion. The Etherial part, and especially the Globes of Light are made for Agitation, yea their Essence consists in it, for Fire is nothing else but fine and subtile Matter in motion. Wherefore if we conceive aright of Things, we shall apprehend it very reasonable to believe that the Celestial Bodies are in perpetual Motion, and that they move not only about their Center, but fall out into a Progressive Motion, and constantly remove from one Place to another, at least in respect of the other Bodies that are about them, or are in other Spheres or Orbits: For we do not now go upon the Notion which *Des Cartes* hath of *Local Motion*, according to whom the Earth doth not properly move, but only its Vortex in which it swims; whilst the Earth it self is all the time in perfect rest, because it changes not its Place, but continues in the same Space it was in at first. But we deal not now with the *Cartesians* but the *Copernicans*, who hold that the Heavens (properly speaking) stir not out of their Place, but may be said to stand still; or however in comparison of the Body of the *Earth* they may be said to have but an inconsiderable Motion: For this is one Argument which is used by them for their Opinion, *viz.* That it is not likely that such huge vast Bodies as these, and so many of them should be set a moving, when-as the Earth is of a small Bulk in respect of them,

them, and might soon be turned about, and besides it is but one single Body. This hath been the constant reasoning (if I may so call it) of those that adhere to the *Copernican System*. *Galilæus* argues after this manner in his * *System of the World*; and so † *Kepler* infers the Motion of the Earth from its Smallness, and the Greatness of the Heavenly Bodies. Another || great Mathematician uses this Comparison, The Earth is more easily moved (saith he) than the Celestial Luminaries, as a Mother with more ease can take her Children and set them at the Fire to warm them, than she can remove the Fire to them. Thus they all along fancy that it is a very troublesome thing for these huge Globes to remove from place to place: They conceit that the greatness of these Bodies makes them incapable of moving with ease.

But this is Unphilosophical, and therefore we may justly look upon the Argument drawn from it as so too. What Man of unprejudiced Thoughts can perswade himself that * *Varenius* (who sums up in brief the Sense of all the *Copernicans*) discourses closely when he saith, "It will appear that the Earth moves about its Axis, if we consider the vast Magnitude of the Stars in respect of the Earth."

* Dial. 2. † Epit. Astron. Copern. lib. 4. || Lansberg Progymnas. * Geograph.

“Earth. The Sun is above two hundred
“times bigger than the Earth, and the Fixed
“Stars are above a thousand times bigger
“than it. Now, is it not more likely that
“the Earth moves than that these vast Bo-
“dies move from Place to Place? I answer,
No: the thing is not at all likely, for the
vaster these Bodies are, the more easy is their
Motion. This is plain, because where there
are the more parts in Motion, there the im-
pulse is stronger and more vehement: And
where there is this Vehemency the Motion
must needs be facile, it being put on with so
much Strength and Vigour; especially, if we
remember that God impress'd this Motion at
the very first, and so it is natural, and conse-
quently is easy. This, I think, sufficiently
proves that they who argue from the Bigness
of the Sun and other Heavenly Bodies to the
Stability and Rest of them, have no ground in
Reason and Philosophy. No: they talk after
a popular manner, and because they see that
Bulky Persons do not stir about with that
nimbleness which is observ'd in others of a
lesser Size, they think it is so with the Sun
and Stars, or that they are idle and lazy, and
loth to bestir themselves. Or it may be they
proceed on that Vulgar Maxim, *viz.* That
great Bodies move slowly. And because that
those of the Heavens are *very great*, they will
not suffer them to move at all; forgetting in
the

the mean time that it is their very Nature to move, and that their Make and Constitution prompt them to it.

Secondly, The *Copernican* Opinion seems to confront a higher Principle than that of Reason. If we will speak like Men of Religion, and such as own the Bible, we must acknowledge that their Assertion is against the plain History of the Holy Book; for there we read that * *the Sun stood still* in *Joshua's* time, and † *went back* in King *Hezekiah's*. Now, this Relation is either true or false, (it must be one of them): If it be the latter, then the Inspired Scripture is false, which I take to be as great an Absurdity as any Man can be reduced to: If it be the former, *i. e.* if the Relation be really true, then the Sun hath a Diurnal Motion about the Earth; for the Sun's *standing still* could not be a strange and wonderful thing (as it is here represented) unless its general course was to *move*. This any Man of Sense will grant. And so likewise the Sun's *going back* doth necessarily imply that it *went forward* before: And if it did so, surely it *moved*. This I think no Man can deny, and consequently it is evident that the Sun hath a Progressive Motion, and goes from one part of the Heavens to the other. If it be said (as it is suggested by some) that the Sun only
D *seemed*

* Jos. 10. 13. † Isa. 38. 8.

seemed to stand or to go backward, then farewell all *Miracles*, for they may be only *seeming* Ones according to this Answer: Which is as much as to say, There are no such things in Truth and Reality. If it be said (as I know it is) that this manner of speaking is only in compliance with the Speech and Notion of the Vulgar, I grant indeed that the Scripture speaks so very often, (as I have * elsewhere shew'd from several Instances both in the Old and New Testament): yea even when it makes mention of some of the Heavenly Bodies, the Expressions are according to the Capacity and common Apprehension of Men, and not according to the Accuracy of the Thing. So that I do not think that a Body of Natural Philosophy, or a System of Astronomy, is to be composed out of the Bible; this being design'd for a far greater and higher Purpose: Yet this I say that whenever the Scripture speaks after the foresaid manner, concerning these things and several others, it doth it in that manner that we may plainly see that the Words are not to be taken strictly and properly, but only in a popular way, as might be shew'd in abundant Instances. But it is not so here, for in the forenamed Places we have Matter of Fact plainly and directly set down; we are told what Prodigious Things happen'd in

* *Discourse concerning the Style of Scripture.*

in those Days, *viz.* that upon the Request of *Joshua the Sun stood still* (as well as *the Moon stayed*): And that we might not think that this is spoken popularly, and meerly according to the common Notion of Men, the very same words are repeated, and others are added to convince us that they must be meant in the plain and proper Sense of them. So *the Sun stood still, yea in the midst of Heaven, and hastned not to go down about a whole Day.* All this is said to let us know that it was a Reality, and not an Appearance; that what is here said is spoken properly, and not in conformity to a receiv'd Opinion. And if it should be said that the Hebrew word used in the former of these places is *dum*, which signifies *to be silent*, as well as *to stand still*; any one that is not prejudiced may see that it is here of the latter Signification: For in the next Verse *gnamad stetit* is the word, and is apply'd to the Moon, and immediately after to the Sun: And the *Seventy* translate it by *isru*. And so in the other place it is in plain and intelligible Terms related that *the Sun returned ten degrees, by which degrees it was gone down*: Than which there can't be more perspicuous Terms to assure us that the Sun itself really moved backward. Though vulgar Expressions are used at other times by the Sacred Writers (which is readily acknowledged) yet in such a Case as this, when there is a

plain Narration of what happened, and when it is a Supernatural and Extraordinary Occurrence, even a *Miracle* that is spoken of, we cannot reasonably bring our selves to believe that they merely conform to the Apprehensions of others, but we must needs be perswaded that they speak according to the Nature of the Things themselves. The upshot then is this, that the Sun moves round in a Diurnal Motion, or else we must hold that the *standing* of it, and its *going back* were no *Miracles*. This to me is a very considerable Argument, and I suppose will be thought so by those who reverence the Holy Scriptures, and believe the Historical part of them to be true.

Thirdly, Men do not frame right Notions concerning this lower World and the Nature of it, whilst they defend the other Hypothesis: For I find that they have a very mean Opinion of this *Terrestrial Habitation*, such indeed as is both unworthy of God, and of Themselves the chief Inhabitants of it. For tho the *Earth* be a dull Sediment in respect of the Bodies of the Sun and Stars, and though it be a shrivel'd Point in comparison of those vast Globes, yet this is to be remembr'd that it far surpasses all those Celestial Regions, and whatever is in them, because it is made the Seat of *Man* of whom God hath so great a Care, and to whom he bears so ineffable a Love. What are the Heavens in comparison

son of this Glorious Creature? What is the Brightest Constellation in respect of the Organiz'd Fabrick of Humane Bodies? What is the Sun if compar'd with the Rational Soul of Man? God hath signally honoured and dignified the *Earth* with making it the Receptacle and Dwelling Place of this his most Beloved Favourite. I say *most Beloved*, for the Singularity of Divine Love was shew'd in restoring Mankind, when the like Favour was denied to the Apostate Angels. The very Glorified Saints above are but a Colony of this *Earth*, transplanted hence to those Superior Habitations. Yea, the *Angelical* Spirits (next to their attending on the Divine Majesty, and enjoying his more immediate Presence) were made to be Servants to this Darling of his Love. He that considers this (and whoever doth not, reflects not on the Prerogative of his Nature) must be forced to acknowledg that *Man* outshines all the World besides, and is crowned with Glory and Honour above all other created Beings, and that the Place of his Abode is a Palace, a Paradise: For it is made such by so Noble, so Divine an Inhabitant dwelling there. He therefore forms a wrong Notion of this *Terrestrial World* who doth not prize it for the sake of the choicest Creature in it, and because of the peculiar Privileges and Honours conferr'd upon it. The *Earth* was purposely made by God to be the Resi-

dence of Man, who is the Glory of the Creation; it was appointed to be the Scene of all Humane Actions, to be the delightful Resort of Angels and Arch-Angels, to be the happy Ground on which the Holy JESUS (God and Man) was to tread, and to be the Stage whereon the Blessed *Millennium* shall be celebrated. The *Earth* thus considered is not inferior to the Sun, Moon and Stars; yea it far excels them: And though it be much Lesser in Space and Quantity, yet in these forenamed respects it is far Greater and Nobler than they. Therefore those who prefer these to that (in the Latitude wherein I have represented it) esteem things by their Bulk and Magnitude, and not by their real Worth. Of this number was our Countreyman *Gilbert*, else he would not have said, * *It is ridiculous that the Heavens should move for our sake, and for the sake of the Earth which is so small a Globe.* And yet observe the rashness of this Writer; and of others who talk after this rate: *Man* is less than the *Earth* (that I suppose they will not deny), why then is the *Earth* according to them moved about for his sake? So they plainly confute themselves by this Argument from the Bulk of the Bodies: Therefore let this be never mentioned again.

When

* De Magnete, l. 6. c. 3.

When we behold a King incircled with his whole Court, and attended on by Officers and Guards, and a numerous Retinue, we can't but acknowledg that all these take up a great deal more room, and make a greater shew than He doth: Yet they were all of them design'd but to be his Attendants, and to be serviceable to him, *i. e.* to his Royal Person and Government. Just so it is here, *Man* is the King and Monarch of this Inferiour World, * *God hath made him to have Dominion over the Works of his Hands: He hath put all Things under his Feet: All Sheep and Oxen, yea, and the Beast of the Field: The Fowl of the Air, and the Fish of the Sea, and whatsoever passeth through the Paths of the Seas.* Thus God hath placed him here to Rule and Govern; and all the spacious Heavens round about him are but his Attendants and Ministers, they are the Train of this *Great Prince*, whom God out of his Immense Bounty and Philanthropy hath made so in this Terrestrial World. And this Beloved of God, this Mion of Heaven is fitly seated in the middle of the whole World, in the Heart of the Universe, and is environ'd with Stars, and enclosed and protected with a shining and flaming Guard. The Glorious Furniture of the Heavens is for his Service as well as State and

* P^sal. 8. 6, &c.

Royalty. Those vast Luminaries shine, those lofty Flambeaus burn to give him light. Those Globes of Fire are to warm and chear him, and they all keep their constant Rounds for that very purpose. It is true, they are larger and more splendid than *Man*, or whatever we see on the Earth, yea than the *Earth* it self: But yet it is certain that they were all made for the use of this Lower Region and Center of the World, they were design'd by God to be serviceable, yea tributary to it, and therefore they continually move, and act, and are restless in their Service, whilst the *Earth* stands unmoveable to receive their Influence, and whilst *Man* sits still and is waited upon by them.

I know it will be said that the *Earth* is of the same Make and Constitution with the *Moon* and the other *Planets*, because they are Opake Bodies as this is, and therefore this must be reckoned as one of them, and consequently deserves not that Character which I have given it. But the Answer is easy, namely that though we allow the Earth to have Affinity with the Planets in respect of its Opacity, yet it follows not thence that they are equal to it in other regards. If they could prove that *Mercury* and *Venus*, or the Moon it self are inhabited by Mankind, then indeed they might have something to alledg to the purpose; but this they are never able to do, and those
who

who have attempted it have been laught at for their pains. *The Voyage to the World in the Moon* was a wild Conceit ; and it is a sign the Moon had an influence on the Author. There is but one Stock of Mankind ; and there is but one Earth that receives them and is the Place of their Abode. This *Dark Spot* then (if you will so call it) is a Peculiar, it is not to be likened to any other part of the Universe, for it is the Only Habitation of the *Sons of Men*, who were so entirely beloved of God that he himself became *Man*. Nay, it surpasses all the *Planets* in other respects, for they are not stock'd with *Vegetables* of all sorts, they are not enrich'd with *Metals* and *Minerals*, they abound not with *Animals* of various kinds. There are no such Things there as these which I have named : and he that saith the contrary let him prove it. There is therefore a great mistake in the foresaid Allegation or *Objection* ; for though our Earth may be said to be another Moon if we speak of it as a dark and a solid Body, yet there is no Likeness or Equality between them, if we consider the particular Honour done by the Almighty to this part of the World, above all others besides, in making it the Treasury of those things which I last mentioned, and also the Dwelling-place of those choice Creatures who have the happy Privilege of being loved and honoured by him above all other Beings in the World.

World. This is the Notion I have of this Matter, and though I were not absolutely and infallibly sure that it is true, yet I am certain it is very rational and accountable, and I am sure no Man can disprove it : No, not he that hath so publickly defamed and libell'd our Mother *Earth*, calling it *mere Ruines and Rubbish, a broken and confused Mass, an indigested Pile, a monstrous and deformed Lump, a little dirty Planet, the Dirt and Scum of the Creation*; for these are his cleanly Expressions in his *English Theory*. This is not the Stile of a Philosopher, nor is it the Language of Truth, for in respect of the several things before-named the *Earth* is the most excellent part of the visible and material Creation.

Fourthly, I would argue thus, Why do we check and gall (and not undeservedly) the *Romanists* with this, that they deny their Senses in holding of *Transubstantiation*? And why do we condemn the Doctrine of Transubstantiation for being contradictory to the verdict of our Senses, if we hold that the Earth turns round notwithstanding we have no notice of it in the least by our Senses? Or, can we be wheel'd and hurl'd about every minute as fast as we can imagine, and yet have no Apprehension of it, not only not feeling the Earth move under us, but not perceiving the Air at all moved, nor having any intimation of it by our Sight, or any other Sense at any time

time of our whole Lives? This is not to be believ'd, and why therefore do any take the Confidence to assert the Earth's moving under them when they have no *Sense* of it? For this is certain that if there be any such thing, it is the proper Object of *Sensation*. But if we admit this which is so much against our Senses, we may as well embrace *Transubstantiation*, which is a defiance to our Senses. If any Man satisfactorily answers this, I shall be enclined to be a *Copernican*, and I shall have a great Temptation to believe the Doctrine of *Transubstantiation*, I mean upon this account of our *Senses*, though there are other Arguments which are purely Theological that will for ever uphold the contrary belief in me. In short, it is strange to me that such a considerable piece of Natural Philosophy as this, the Object of which is Corporeal and Sensible, should have no proof from any of the Senses. A *Romanist* with his *Hoc est corpus* may solve the matter, but I do not see how this can be the Philosophy of one of the *Reformed*.

I know it is usually said that the Vertigo of the Earth is not felt, or perceived by us, because we are *used* to it. Indeed if this Motion were slow and gentle, this might pass for a good Solution: But when it is very swift and rapid, fierce and violent, (as they suppose it to be) we cannot imagine that Custom will wholly take away the Sense of it, and that we shall

shall neither discern it with our Eyes, nor with our Ears, nor with our Touch. That of the *Pythagoreans* is as plausible, that the Heavenly Orbs make an Excellent Melody and Harmonious Sound, but Men by their continual being used to it hear it not. The Asserters of the Earth's Motion may in time persuade their Disciples that there is such a thing as the *Musick of the Earth*, as well as the *Spheres*.

But they tell us that we must not expect to be sensible of this Motion of the Earth ; for when a Man is in a Ship under Sail, suppose he be in a Cabin, or in any place under Deck, he can't discern whether the Ship moves. But this doth not reach our Case, for we are not cabin'd or shut up in the Earth. Besides, to go on strait in a direct Line (as a Ship in its general Course) and to be violently whirl'd about with the Earth, are two different things : For I suppose they do not speak of a Ship in a Storm or Tempest, for then the Motion of it is sufficiently discern'd, though a Man were coop'd up in his Cabin, or were lodg'd in the Hold. And then, if we suppose a Man upon the Deck and looking about him, whilst the Ship is under Sail ; he can easily satisfy himself that the Vessel moves, though there be no other Ships, or no Land in view : for if he throws out into the Sea a Barrel, or any other thing that will swim upon the Waters, he will discern

cern by his Eye that the Ship moves, because that which he cast into the Sea will speedily be out of his sight; and the faster he sails the sooner will he lose the sight of it, whereby he certainly knows that the Ship was in Motion. Therefore I conceive this Instance which they make use of is not available to the End for which they produce it.

Again, I argue thus, the Motion of the Earth can be felt, or it cannot: If they hold it cannot, they are confuted by *Earth-quakes*, I do not mean those that are accompanied with violent Eruptions of the inclosed Vapours, and a downfal of some part of the Earth, which are more than a simple Motion, but I mean the gentler Tremblings of the Earth, of which there are abundant Instances in History, and we our selves have had one not long since; so that by too true an Experiment we are taught that the Earth's Motion may be felt. If this were not a thing that had been frequently experienc'd, I confess they might have something to say, they might put us off with this, that it is *not possible* to perceive the moving of the Earth: But now they cannot evade it thus; they must be forc'd to acknowledg the Motion of it is sensible. If then they hold this, I ask why *this Motion* also which they speak of is not perceived by us? Can a Man perswade himself that the light Trepidation of this Element can be felt,
and

and yet the rapid Circumvolution of it cannot? Are we presently apprehensive of the Earth's shaking never so little under us? And yet have we no apprehension at all of our continual capering about the Sun?

But they will say it is another sort of Motion, and they say right: But then they must remember that it is a Motion that is much more easily perceived than the other, for that is but a Jogging of the Earth, whereas this is a fierce and vehement Whirling it round about. Who therefore can deny that this is more sensible than that? And if it be more sensible, what is the reason that according to them we have no perception of it? Or, is a thing sensible, and yet not the Object of Sense? Nay truly, if the Earth were hurl'd about in a Circle, (as these Persons assert) we should feel it to our sorrow, for we should not be able to keep our ground, but must necessarily be thrown off, and all Houses and other Buildings would be thrown down, being forcibly shaken off from the Circumference of the Earth, as things that are laid on a Wheel are flung off by it when it turns round. This you will find demonstrated by * *Dr. More*.

It may be they will say there is a Difference between a Motion of a part of the Earth (as in the usual Shakings of it) and of the whole
(as

* *Immortality of the Soul*, Book 3. chap. 13.

(as in the present Case) : Yes, I grant a Difference, but it makes against them, for the the moving of the whole Terrestrial Mass is a more sensible thing than the Motion of a part of it only. Therefore if we feel this latter, we may feel the former, *i. e.* we may feel it if there be any such thing: But it is evident there is no such thing, because we have no Sense at all of it. For this and other Reasons I take the Immobility of the Earth to be an unshaken Verity : I hold it a consistent and rational System, that the Earth is the Steady Center of the Material World, and that the Sun and Fixed Stars with their innate Light, and the Planets with their borrow'd one, wheel about this Beloved Spot, and as it were dance round the Lord and Owner of it, who is the Glory of this Visible World, and the Image of the Supream Deity.

To conclude, having thus offered my Own Thoughts on this Controverted Point, I commend the Reader to that Accomplished Mathematician and Astronomer *Ricciolus*, who hath in his * *Almagestum Novum* several Demonstrative Arguments against the *Copernican* Hypothesis, which if they be well weigh'd will be found to have great Force in them. However, this must be said that there is no certain Proof, there is no Demonstration of
the

* Lib. 9. Sect. 4. cap. 16. usque ad finem Sect.

the Contrary. For tho there is a Great and Celebrated Experimenter in Philosophy, one whose profound Insight into all Mathematical Secrets is well known to the World, and whose Integrity and Faithfulness in discovering what he hath found out are not to be question'd in the least, though there is (I say) such an Excellent Person who hath offer'd something to *demonstrate* the Earth's Diurnal Circuit, for he found that there was a * sensible Parallax of the Earth's Orb among the Fixed Stars, and particularly that Fixed Star which is in the *Dragon's Head*; yet no Man knows better than himself, that *Demonstrations* that depend upon Eye-sight are fallible and uncertain; witness the Disputes that have been between the Learnedst Mathematicians about *Parallaxes*, and several other matters which are to be judged by Sense. And this Gentleman himself declares that he was not fully satisfied with the Observation which he made, because by reason of inconvenient Weather and some other Causes he could not make it exactly. Therefore (with all Defence and Respect paid to this Learned Gentleman and other Great Philosophers of our own Nation) I look upon the Motion of the Earth as an Ingenious Conjecture only: And so some of the most Judicious Writers have granted

* Mr. Hook's Attempt to prove the Motion of the Earth.

granted it to be. But since several Persons of Eminency have appear'd in its behalf, and have espous'd it as a true Hypothesis, it hath been taken up for a *modish* piece of Philosophy (for there is a *Mode* in Philosophy as well as in Clothes or any thing else); and it hath been thought ridiculous by some not to conform to it. He is not reckon'd a *Virtuoso* who makes not this one of the Articles of his *Philosophick Creed*: I am verily perswaded that molt become tame Profelytes to this Opinion merely in Compliment to some considerable Persons who vouch it. This is one of the chiefest Reasons why the *Copernican* Notion is so prevalent. The other Doctrine, held by the Old *Peripatetick* Gentlemen and others heretofore, is grown out of *Fashion*, and therefore is rejected. I speak not this as if I were against any Ingenious Discovery or Invention be it never so *New* (as I have already declared) or against any *Philosophick Liberty* justly so called; but then I would have it bottomed on some good Foundation, something that a Man can have some Notice of by Sense or some other plain way. But such is not the Doctrine of the Earth's Circumrotation: Therefore it is (so far as I have hitherto discern'd) a precarious and groundless Opinion, and is the vain result of *Copernicus's* Gigantick Attempt to raise up the *Earth* into the place of the *Heavens*.

I will only add this one thing more, That seeing *Copernicus's System* begins to be *Vulgar* and *Common*, I thence expect its Declination; for very few Opinions of this Nature are long-lived when they come to be generally received. For the Great and Ambitious Wits disdain what is Common, and much more that which is Old, and accordingly will bethink themselves of some New System, or perhaps will retrieve the Old One, which will seem New and Fresh at first, especially from those Colours which they may give it. Thus the Opinions concerning the *Earth* go round, when That stands still. For my part, I keep my Ground, and presume to proceed upon the *Antient* Hypothesis: Which yet is not altogether so neither, for that Great Soul of Astronomy *Tycho Brahe* hath maintain'd it, making the Earth the Moveless Center of the World. About this moves the vast Machin of the *Heavens*, being set into Motion by the Almighty Architect and Framer of them. But especially the Motion of the *Sun* in so *constant* and *regular a Course*, is to be taken notice of by us with Religious Admiration. If its Revolution were stopt in any one part of Heaven, that side of the Earth which is next to it would be scorch'd and burat up, and the opposite side would be all frozen, and by that means the whole Earth become useless; which may give us some account of the great Blessing which we enjoy by the Circular Progress of the Sun. CHAP.

C H A P. III.

The Oblique Course of the Sun, being the cause of the Vicissitudes of Day and Night, of Winter and Summer, which are so beneficial to Mankind, is an Argument of the Divine Care and Providence. The Powerful Influence of the Moon evidences the same. So do the Planetary Stars, and Fixed Ones: Which latter are eminent for their Magnitude, Number, Beauty and Order, Regular Course, Use and Influence; all which set forth the Wisdom and Goodness of the Beneficent Creator. The Study of the Stars leads us to God. Astronomy Useful.

BUT more particularly and signally the Course of it in that *Oblique Line* which it makes is most remarkable, and is a Proof of a Wise Being who order'd it so at first for the Good of the World. For I listen not here to what a * Modern Author suggests, that the Heavens before the Deluge in *Noah's* time had not the same Course they now have. As if the Eruption of the *Flood* had reach'd to the Celestial Orbs, and had wash'd the Sun, Moon and Stars. We read that God threatned to

E 2

send

* D. Burnet, *Theoria Tellur.*

send a floud of Waters on the face of the Earth, Gen. 6. 7, 13, 17. but there is not a word of the *Heavens* being concern'd in the Inundation. But this Learned Writer tells us that not only the *Earth* but the *Heavens* are not the same that they were at first, but that they have another Form and State; and particularly he saith that the Situation of the Earth in respect of the Heavens is not what it was at the beginning. The Earth was not, saith he, Oblique to the Sun or the Axis of the Ecliptick, as it is now. But this is mere surmise, because it is apparent that the present Situation of these Bodies is most convenient and useful, and would well become the *Paradisical State*. For it is this, and this only that causes an Inequality of Heat and Cold, from which proceeds a Variety of Seasons. Hence are Spring and Autumn, when the Sun touches the Equinoctial, and makes the Days and Nights of an equal length twice a Year: Hence are Summer and Winter, when the Sun visits the Tropicks, and its Rays either fall perpendicularly upon the Inhabitants, or when it is removed at the greatest distance from them. This is the effect of the Oblique Posture of the Sun to the Earth, whereby this latter is kept in good temper, and made serviceable for the use of all Creatures that proceed from it or inhabit on it. It is this Vicissitude of Seasons that makes the Earth pregnant and fruitful,
and

and gives Life and Increase to all Vegetables and Animals: Whereas a continual Winter or Summer would be destructive to them. If the Motion of the Sun were streight and direct through the *Equator*, Heat and Cold would be disproportion'd, they would be either too much or too little, and consequently the generation and growth of all Fruits and of all living Creatures would be hindred, and infinite Inconveniencies would follow. (Of which I shall have farther occasion to speak, when I come to treat distinctly of the *Earth*).

Wherefore we are oblig'd to take notice of the singular Care and Providence of God in this present disposition and posture of the Heavens: We have reason to applaud the Divine Wisdom in the Language of the Psalmist, *Thou hast made Summer and Winter*, Psal. 74. 17. This is a plain and sensible Demonstration of a Divine Superintendency. There were some of old who fancied that the Gods *subtracted their Influence in the cold part of the Year: And particularly it was the Conceit of the *Phrygians* that God slept in Winter, but awaked in Summer. This was the effect of their gross Ignorance and Inconsideration, for it is certain that to an Intelligent and Considerate Man it will appear that Winter hath its

* Plur. de Isid. & Osir.

54 *God's Being, &c. prov'd*

Conveniencies proper to it, and those no less than what the Summer hath: Both are requisite for the Good of Mankind, because thence proceeds the Alternate Diversity of Seasons, which is of so great use. This excellent Order and Succession of Times, which are distinguish'd by a constant Variety, were alledged by the * Antient *Christians* as an undeniable proof of a God. And the *Gentile* World was forward to own and celebrate that Wise Benefactor:

† *Qui mare & terras, variisque mundum
Temperat horis.*

Now, we cannot deny that these *Different Seasons* depend wholly upon that Position and Motion of the Sun which I have been speaking of. If this Bright Luminary should leave the Ecliptick, and make its Course in another Line without Obliquity, these would presently cease, and thereupon this Lower World would soon be in Disorder and Confusion. Wherefore a || Wise and Observing Writer thought he had reason to spend a Chapter in setting forth *the Wisdom of God in the Site and Motion of the Sun.*

The

* Quid cum ordo temporum ac frugum stabili varietate distinguitur? nonne auctorem suum parentemque testatur? Verumque cum suis floribus, & æstas cum suis messibus, & autumnus maturitas grata, & hibernæ olivæ necessaria, &c. Minut. Fel. in Octav. † Horat. || Dr. Brown, *Vulg. Ex.* l. 6, c. 5.

The orderly Succession of *Day* and *Night*, which is from the *Diurnal* Motion of this Lamp of Heaven, doth no less argue the Divine Wisdom and Conduct. Once in four and twenty Hours all People in the World, excepting a few toward the Poles, have *a Day* and *a Night*. And this latter, which is the Shadowing of the Earth, when the Sun is gone from us, is as useful and necessary as the former. For (as a * Great Naturalist speaks) were it not for Darkeness and the Shadow of the Earth, the Noblest part of the Creation had remained unseen, and the Stars in Heaven as invisible as on the Fourth Day when they were created above the Horizon with the Sun, and when there was not an Eye to behold them. Again, Night is not only for Rest and Cessation of Labour, which is absolutely requisite for Mankind and other Creatures, (except those wild Ones, those *Beasts of the Forest*, Psal. 104. 20. who *creep forth when it is dark, and lay them down in their Dens when the Sun ariseth*, and so turn Night into Day, and Day into Night); but for the cooling and refreshing of the Air, and moistning the Earth, and for receiving the proper Influences of the Moon and other Planets, and of the Fixed Stars, which as they shew themselves, so they exert their Vigour most strongly in the Ab-

E 4

sence

* Dr. Brown, *Cyrus's Garden*, ch. 4.

sence of the Sun. Wherefore the Royal Psalmist joins both these together, as equal Instances of God's Power and Providence, *The Day is thine, the Night also is thine*, Psal. 74. 16. And to the same purpose again, Psal. 65. 8. *Thou makest the outgoings of the Morning and Evening to rejoice, i. e.* both these do praise and celebrate the Honour of their Maker, and do as 'twere rejoice in it. There is not certainly a more convincing Argument of the wise Direction of an Almighty Being than this Daily Progress of the Sun, in so much that he is said *to know his going down*, Psal. 104. 19. *i. e.* by the guidance of an All-knowing Actor he sets and rises in that place and at that time, where and when we see he doth.

By the same Superintendency its *Monthly* and *Annual Motion* is performed: By this it takes up its several Mansions and Lodgings as it were in the *Signs* through which it passes: By this it compleats its Course through its several Stages in its Circuit about the World. Which is thus expressed by the Psalmist, *His going forth is from the end of the Heaven, and his circuit to the ends of it*, Psal. 19. 6. He travels just so many Degrees toward the North, and as many toward the South every Year, and is bounded on both sides by the *Tropicks*, beyond which he never stirs. Therefore from this *tekuphah*, (which we render *Circuit*) this stinted Revolution, the Jewish Masters

Masters call the *Tropicks Tekuphoth*. Who is there that doth not find himself as 'twere forced to believe a God when he considers these things, which cannot possibly be without an Intellectual Guide, without a Principle that acts from Wisdom and Counsel? Yea, after all, if the *Copernican* Hypothesis should be true, *i. e.* if the Earth rolls about on its Center, and so turns it self to the Sun in its various Positions, yet still there are the same Effects of this that there were of the other Revolution; the Good and Benefit of Mankind are promoted, and the Power and Goodness of the Great Benefactor are declared.

Secondly, The *Moon*, though it be the lowest of all the Planets, and about 40 times less than the Earth, yet it is a * *Faithful Witness in Heaven* of those foresaid Perfections of the Deity. It is but an Opake Body, it is but the Sun Reflex'd, it is no other than a † *Celestial Earth*, or an *Earthly Star* (as some Philosophers of old stiled it.) Though this is to be said, that it is not properly an *Earth*, *i. e.* it seems not to be a Body wholly Dark, as is evident in the Eclipses which it is incident to, for then we may discern its whole Body. Therefore it is not altogether destitute of Light, it hath an intrinsick Glimmering of
its

* Psal. 89. 37. † Τῇ Ὀλύμπῳ, ἀστρον γῶδες. Plut. de Orac. defect.

its own. But because this is very faint, the Lunar Body may be reckon'd as Opake. But notwithstanding this (which the more signal-ly advances the wondrous Power of the Creator) it hath a mighty Influence on this Inferiour World and all things in it : So that we could no more be without this than without the Sun. And this powerful Influx which is of such use, yea of absolute necessity to us, is increas'd or diminish'd (either of which are requisite accordingly as there is occasion) by its *Different Postures* and *Figures* in which it appears to us. For in its going round our Earth (by *Copernicus's* leave) it turns it self variously to the Sun, whence it is necessary that according to its various access to or recess from that Luminary, more or less of its enlightned half be turn'd toward us, and that it appear in divers Phases and Shapes; by which means its Virtue is communicated in a manner proportionable to our several needs: Especially when this Lunar Body is in the Full, *i.e.* when all that part which is toward us is replenish'd with Light, all Plants and Animals, the Air, the Earth, and the whole Ocean (which is observ'd to swell at that Season) feel its Power and Vigour. Whence as you read of *the precious Fruits brought forth by the Sun*, so also of *the precious Things put forth by the Moon*, Deut. 33. 14. Some of the choicest and most valuable Products of Nature are from

from the particular Influence of this Second-Hand Sun, which most officiously supplies the place of the Other, and makes some amends for his absence, by being a *Remedy* (as * *Pliny* speaks) *against the Night's Darknes* in several parts of the World: And to that purpose it dispatcheth its Course through the *Zodiack* every Month without fail.

Thirdly, The *Stars*, both *Planetary* and *Fixed*, attest a Divine *Numen*. The former of these are distinguish'd from the latter by their particular Colour, Motion, Size, and Distance from us. *Venus* is clear and bright, and goes through the *Zodiack* in a Year; and is less than the Earth 6 times: And yet is the biggest next to the Sun and Moon, as to appearance. *Mars* is of a Firy Hew, it passes through the 12 Signs in the space of 2 Years; and is less than the Earth 13 times. *Jupiter* is fair and coruscant; is bigger than the Earth 14 times, and is many Years making its Passage through the *Zodiack*. *Mercury* dispatcheth his Revolution in a Year, and is 19 times lesser than the Earth; and is the least Planet as to sight. *Saturn* is of a pale Colour; this slow-paced Planet is 30 Years performing its Course, and is 22 times Larger than the Earth. Some of these Planets as
Venus

* Sidus in tenebrarum remedium ab naturâ repertum. Nat. Hist. l. 2. c. 9.

Venus and *Mercury*, are Pages or Lackeys to the Sun, and never go far off from it : But the rest, as *Mars*, *Jupiter* and *Saturn*, are not so tied to attendance on their Illustrious Master : They can go farther off, and ramble six Signs from the Sun, and so be Opposite to it. And as there are these Primary Planets, so there have been Secondary ones discovered of late, *viz.* four about *Jupiter*, and two about *Saturn*, which have their peculiar Motion about their Primary and Central Planets : And both of them are situated and govern'd by Him that gave them their Nature. But as to the *Situation* of these Planets with respect to the Earth, and as to their *Motion* and *Magnitude*, there is a great disagreement between the *Ptolemaens* and the *Copernicans* : And *Tycho* differs from both these, and then comes *Des Cartes* and disagrees with them all : Therefore what hath been said before as to any of *these*, must be submitted to those that are able to judg of these Hypotheses.

Then as to the *Fixed Stars*, which in the Inspired Book are justly call'd *the Stars of God*, Isa. 14. 13. because of their Greatness and Height ; for in the Sacred Stile *God's Name* is frequently used to express what is Great and Excellent. And such are these Heavenly Bodies, which are so many *Suns* at a distance from us ; for those Firy Globes are of the same Make with the Solar Body : And if they were

as near to us as this, they would appear not inferiour in Bulk and Brightness to it. These Vast Lights are so remote from us, that Telescopes (which magnify the *Planets* after a great rate) make these seem no bigger to us, or very inconsiderably. And this is one cause of their *Scintillation*; they are so far off that their Rays are much more refracted than those of the wandering Luminaries. They quake and tremble because of the different Mediums they appear through: Though this *Twinkling* may arise also from the greater Fulgor of these than that of the Planets, which causeth a more vehement Vibration on the Eye. The Least of these is far greater than the whole Earth; and one of the Largest Size is a hundred times bigger: And so this Globe of the Earth and its whole Vortex are inconsiderable, and shrink into nothing if compared with those innumerable Orbs above us. This stupendous Magnitude argues the Greatness, yea the Immensity and Incomprehensibleness of their Maker. And if it be ask'd, Whence is that Fewel for those vast Fires, which continually burn? Whence is it that they are not spent and exhausted? How are those Flames fed? None can resolve these Questions but the Almighty Creator, who bestowed upon them their Being; who made them thus Great and Wonderful, that in them we might read his Existence, his Power, his Providence.

Nor

Nor is their *Number* less admirable; which exceeds our mean Arithmetick: And therefore *to tell the Stars* is mention'd as an insuperable Task, *Gen.* 15. 5. God promis'd *to make Abraham's Seed as the Stars of Heaven*, *Gen.* 26. 4. which if compared with *Gen.* 13. 16. will be found to be of the same import with *making his Seed as the Dust of the Earth, which is innumerable.* It is true, the *Constellations* (a certain number of Fixed Stars which are together, and seem to make up several particular Figures or Representations) are but sixty four, *viz.* twelve in the Zodiack, twenty nine in the Southern Hemisphere, and twenty three in the Northern One. But if we speak of the Fixed Lights which belong not to any Constellation, they are not so easily reducible: For though there are not above one thousand and four hundred of these visible to the Eye, according to the largest Accounts given us by Astronomers, (who likewise tell us that our *Northern Hemisphere* is the most remarkable for them, for as there is more Earth in this part of the World than in the other, so there are more Stars) yet it is granted by all that there are more of them than are apparently seen; for by reason of their unconceivably vast Distance from us, and because they are Lesser than the rest, they are Invisible. But the Curious and Inquisitive continually discover them, and when they have more perfect
Glasses

Glasses they will discern more, and every day add to their Number, and yet acknowledge that their full Number is not to be told, but by Him whose Prerogative it is to *tell the number of the Stars*, Psal. 147. 4.

And He it was that gave them their transcendent *Beauty* which so ravishes the Eyes of Beholders. For though that of the Apostle be true, *One Star differeth from another Star in Glory*, yet every one of them hath its peculiar Lustre, and all of them together have a Common Glory. But the *Theorist* was not of this Mind, for he tells us, * “ That they “ lie carelessly scatter’d ; as if they had been “ sown in the Heaven like Seed, by Hand- “ fuls ; and not by a Skilful Hand neither. “ What a beautiful Hemisphere would they “ have made, if they had been placed in Rank “ and Order ; if they had been all dispos’d “ into regular Figures, and the little ones set “ with due regard to the greater ? Thus he : And it is no wonder that he who finds fault with the *Earth’s* Deformity and Irregularity, finds the same in the *Heavens* : For nothing of God’s Creation (no not *Man* himself) pleases him. But this I will say, though those Balls of Liquid Fire may seem to be set in the Heavens in a careless manner, though they seem to be scatter’d and thrown about the

* *Theory of the Earth*, Book 2. chap. 11.

the spacious Sky, yet without doubt there is Care and Exactness in the placing of them: They are ranged in an excellent Order, though we apprehend it not, nor can we, because we have but an imperfect view of them. As well the single Stars as the several Constellations have a due and orderly Position, though the Numerousness of them hinders our discerning of it: The Glorious Canopy of Heaven is set so thick with Glittering Lights that we are not able to give an account of the just Figure of them: And yet, because we cannot see them *All*, we are not able to judg of the excellent Proportion of them. Yea, 'tis not to be doubted that even those smaller Lights with which the *Galaxy* is so powder'd and bespangled are all marshall'd according to their proper Stations, and are thereby render'd very *Beautiful*, though we have not yet found out Engines to give us a Conviction of it. This is the meaning of *Job's* words, *ch. 26. v. 13. By his Spirit he hath garnish'd the Heavens*; for the *Stars* are the Garnishing and Adorning of them. And thence according to *Varro* and *Pliny* *Cælum* is *qu. Cælatum*, finely wrought and engraven, exquisitely carved with artificial Workmanship. Which occasion'd that of *Cicero*,* Though the
Stars

* *Quamquam ad mundi coherentiam pertinent, tamen & spectaculum hominibus præbent: nulla enim est insatiabilior species, nulla pulchrior. De Nat. Deor.*

Stars (saith he) be necessary parts of the World, and appertain to its Consistency, yet this likewise is true that they were made to be look'd and gazed upon by Mankind, who cannot possibly entertain their Sight with a more insatiable and beautiful Object. And *Seneca* saith rightly, * Who will not be ravish'd with the sight of this Glorious part of the World, when in a clear Night it displays all its Glittering Fires, and shines with such an innumerable Company of Stars? In every one of which the Image of the Creator is plainly to be seen.

Again, Their *Regular Course* speaks their Author. That a few of them have liberty to *wander*, yet so as not to transgress their Bounds, and that all the rest are so *Fixed* that they move not from their Stations, is the product of an unerring Wisdom and Providence. But when I say that these are thus *Fixed*, it is not to be understood as if they were not in Motion; for they all move, and that from place to place, but in an equal and steady Posture, and all at the same Time, and so they keep the same Distance continually from one another: As, if a great Number of Men should run all at the same time, but some be-

F

hind

* Ipse mundus quoties per noctem ignes suos fudit, & tantum stellarum innumerabilium refulsit; quem non intentum in se tenet? Le Benefic. l. 4. c. 22.

hind and others before, and the rest on this and that side, and observe a due and equal Distance from one another; it may properly and in the strictest Sense be said that they move Progressively, *i. e.* from place to place, though all the time they are not farther off nor nearer to one another. That the Motion and Revolution even of the *Erratick* Lights are exact and precise, constant and unalterable, is evident from this that the very Minute of their *Oppositions, Conjunctions* and other *Aspects*, as well as *Eclipses*, can be foretold a hundred Years before they come to pass. And not only the Planets but the whole *Host of Heaven* (as they are call'd) keep their *Ranks*, and observe an exact Order.

** Nec quicquam in tantâ magis est mirabile mole
Quam Ratio, & certis quod legibus omnia parent,
Nusquam turba nocet, nihil ullis partibus errat.*

In which Words the Poet represents these Heavenly Bodies as endued with Reason, because they are so exact in their Courses. But though this was too high a Flight, and is Poetry rather than sober Philosophy, yet thus far we are upon a true and solid Bottom, that it is the work of *Reason* and some *Intelligent Principle*, that they all obey the Laws that are set them, that the great Crowd of them is not preju-

* Manilius.

prejudicial, that being so Numerous they do not thrust one another out of their Ranks, and run into Disorder and Confusion. * “Such
“an excellent ranging of them (as an Anti-
“ent Writer of the Church speaks) such a
“constancy in observing their Orders and Sea-
“sons could not be at first without a Provident
“Artist, or so long be preserv’d without a
“Powerful Intelligence inhabiting as it were
“in them, or be perpetually govern’d with-
“out a Skilful Ruler, as Reason it self declares.
This was the Foundation, it is probable, of
the *Harmony of the Heavenly Spheres* held first
by *Pythagoras*, then by *Plato*, afterward by
Macrobius, *Boetius*, and even our Venerable
Bede. The admirably Exact and Uniform
Motion of these Bodies, the Constant Order
which they keep in their Revolutions and
Periods, are the true Harmonick Musick and
Concord of them. This is thus expressed by
† a Great Artist, “There is no one, though
“but meanly learned in Astronomy, that will
“not acknowledg, upon his attentive con-
“sidering the Order of the Heavenly Bodies,
“a certain kind of Harmony in the Distances
F 2 “and

* Tanta dispositio, tanta in servandis ordinibus temporibusque constantia non potuit aut olim sine provido artifice oriri, aut constare tot seculis sine incolâ potente, aut in perpetuum gubernari sine perito & sciente rectore, quod ratio ipsa declarat. *Lactant. Instit. l. 2. c. 5.* † *B. Ricciol. Almagest. Nov. Vol. 2.*

“and Motions of the Planets. And a * Great Man, of a very inquisitive Brain, thought so, or else we should not have had these remarkable Words from him, “Could we satisfy ourselves in the Position of the Lights Above, “and discover the Wisdom of that Order so “invariably maintain’d in the Fixed Stars of “Heaven; could we have any light why the “Stellary part of the first Mass separated into “this Order that *the Girdle of Orion* should “ever maintain its Line, and the two Stars “in *Charles’s Wain* never leave pointing at “the *Pole-Star*, we might abate the *Pythagorical* Musick of the Spheres, the seven-fold “Pipe of *Pan*, and the strange Cryptography “of *Gaffarel* in his *Starry Book of Heaven*.

Lastly, In the great *Usefulness* of the Stars we may see the Footsteps and Impressions of the Beneficent Creator. As he giveth the Sun for a Light by Day, so he appointeth the Ordinances not only of the Moon but of the Stars for a Light by Night, Jer. 31. 35. And these Ordinances shall not depart from before him, ver. 36. they are of perpetual use for affording Light in the Night-Seasons, and they are on other accounts unspeakably beneficial to Mankind. The Fruitfulness of the Earth, the alternate Succession of the Seasons of the Year, our Bodily Constitutions, and in part the

* Dr. Brown, *Cyrus’s Garden*, ch. 5.

the Dispositions of our Minds, our Health, our Life, depend upon the Influence and Vertue of the Stars. * Sir *W. Rawleigh* hath suggested very excellent things on this Subject. Our Divine Poet expresses his Sentiments in this Matter thus,

† *And if an Herb have Power, what have the Stars !*

Doubtless our Plagues and Plenty, Peace and Wars

Are there much surer than our Art is sure.

It is not to be doubted that the Ministry of these Heavenly Bodies is made use of in the Government of this Inferiour World. They act continually upon it, and nothing is done without their Influence. *God hath set the Dominion of the Heaven in the Earth, Job 38. 33.* Which is an irrefragable Text to prove that the Celestial Bodies have a Virtue and Power on all Things Below: Both those which are Animate and Inanimate do someways feel the Operation of them. Which proves the First and Original Disposer of them to be a Rational and Intellectual Agent. This is *he that maketh Arcturus, Orion and Pleiades, and the Chambers of the South, Job 9. 9.* This is he that made, and therefore (as himself saith,

F 3

Job

* *Hist. of the World, Chap. 1. Sect. 11.* † *Mr. Herbert's Poems. Of Providence.*

Job 38. 31, 32.) is able to bind the sweet Influences of the Pleiades, (the Seven Stars whose Influence is felt in the Spring) and to loose the Bands of Orion, (which is most predominant in the Winter, and produces Storms, &c.) and to bring forth Mazaroth in his Season, (the same perhaps with Mazzaloth, Planeta, 2 Kings 23. 5. for Lamed and Resh are often changed for one another: but the Rabbins call the Twelve Signs by the name of Mazzaroth) and to guide Arcturus with his Sons, i. e. the Constellation call'd Septem Triones, the Wain, the Bear, together with the other Stars and Constellations of this Southern Hemisphere; which are call'd his Sons. And in Amos 5. 8. He that maketh the Seven Stars and Orion is the Periphrasis of God. And we are bid there to seek him who doth this, we are to worship God because of the Works of the Heavens. His making them (and together with them constituting the Seasons of the Year) invites us to acknowledg and seek him. The Heathens went too far, and wildly asserted these Heavenly Bodies to be Gods: But then we rightly use them when we argue a God from them. And this we may easily do because they set forth the Wisdom of God, and the other Excellent Attributes belonging to him. This is the work of Astronomy rightly improved: It points at the Creator, and conducts us to him, as the Wise Men of old were led to our Saviour

Saviour by a Star. I speak not of that vain Pretence to the knowledg of all sorts of future Events by Inspection into the Stars, which some Impostors talk much of, and would make us believe is a Real Science: This hath been exploded by all the Wise and Sober Heads in every Age. And it might be observ'd that those who have been most addicted to this *Judiciary* way of consulting the Stars, and have confided in it, have felt the Folly of it most signally. Their giving credit to it did procure their Ruine, as we see in *Julius Caesar*, *Pompey*, *Nero*, *Julian* the Apostate, and several others that might be named of a meaner Figure. Their fond trusting to this *Science* (falsly so call'd) prov'd fatal to them, and render'd their Ends unfortunate: But the Study of the Stars is not to be blamed, the *Astronomical* Art is harmless and innocent, yea 'tis useful and advantageous: For by help of this we climb the Heavens, and scale the Ethereal Battlements, but with a Success different from that of the Antient Giants; because they fought the Gods (as the Poets talk), but we find out the True One by contemplating the Starry Bodies. We come acquainted with the great *Nomenclator* of the Stars, * *He that calls them all by their Names*, and enabled *Adam* (as a very † Learned Man thinks) at the same

F 4

time

* Psal. 147. 4. † Vossius de Theol. Gentil. l. 2. c. 35.

time that he gave Names to the Creatures here Below to do the same to these Above; by which Names they were wont to be call'd by the *Patriarchs*, some of which remain in the Bible, as *Gnas*, *Chesil*, *Chimah*, Job 5. 9. Amos 5. 8. but most of them are lost. We step from Orb to Orb, and measure the vast Heavens, and rifle the several Vortices, and make new Discoveries in those Celestial Regions, and thereby frame fresh Arguments of Divine Wisdom in contriving the World; and we extort an acknowledgment of a Deity even from the Irreligious, and such as are most averse to the Notion of a God. For from our Enquiries that Assertion of the Learned *Philo* is made good, * Whatever is contained in the *Heavens* is made and fitted with the greatest Reason and Congruity: There is nothing but what is founded on the most rational Grounds. And we arrive to the Determination of that Wise *Roman*, † What can be more plain and evident, when we behold the *Heavens*, and all Things belonging to them, than that there is a *Numen* of a most excellent Understanding by whom these Things are order'd
and

* Τα ἐν ὁρατῷ πάντα λόγοις καὶ ἀναλογίαις δεδιμύρονται καὶ συντέτακται. ἢ γὰρ ἐκεῖ τὸ παράπαν ἄλογον εἶδέν. De Monarch.
† Quid enim potest esse tam apertum tamque perspicuum, quàm cœlum suspicimus, cœlestiaque contemplati sumus, quàm esse aliquod Numen præstantissimæ mentis quo hæc reguntur? De Nat. Deor. l. 1.

and govern'd? And a little after, he comes to this Final Result, * That there is therefore a God is so plain that for my part I look upon the Man that denies it to be out of his Wits. For the Frame and Contrivance of the *Heavens* (which is the Subject I have been insisting upon, and now am finishing) are sufficient to perswade any Man of a sound Mind of the Existence of an Invisible but Wise Being, who is the Author and Contriver of this excellent System of the Upper World. So little reason had *Alphonfus* X. K. of *Leon* and *Castile*, Author of the *Astronomical Tables* that bear his Name, to utter those blasphemous Words, (as we find related by *Lipsius* and *Spondanus*, and others) that he could have mended the Fabrick of the World if he had assisted at the Creation, especially he could have order'd things better in the Heavens. This was that *Alphonfus* (as † *Lipsius* observes) who was deposed from his Throne, expell'd his Kingdom, and died hated of all Men. || *Mariana* saith he ran mad, being reprov'd by an Hermite for uttering the forementioned Words; but whether that be true or no (as there may be some Ground to question it) it is agreed that he was a most unhappy King, he was de-thron'd

* Esse igitur Deos ita perspicuum est, ut id qui neget vix eum sanæ mentis existinem. † Mon. l. 1. c. 4. || Hist. Hisp.

thron'd by his own Son, and * died of Grief and Melancholy. But though he thus impiously blasphemed the Creation, yet he was not so foolish as to deny a God, the Artificer of all these Works that we behold : Which yet our *Atomical* and *Chance-Philosophers* will not be induced to assert or believe.

C H A P. IV.

The Things which are remarkable in the Space between the Heavens and the Earth administer clear Proofs of a Deity ; as the Air, the Winds, the Clouds (where the late Archæologist is rebuked) the wonderful Ballancing of these latter : Their gentle falling down in Rain by degrees : The Usefulness of these Showers. The Rain-bow. Thunder and Lightning. Snow, Hail, Frost and Ice.

NOW let us go down from these Lofty Battlements of *Heaven* to behold the things that are between this and the *Earth*. Let us descend from the *Etherial* to the *Aerial* Region, where still we shall find every thing declaring a Divine and Omnipotent Creator. The Air, the Clouds, the Winds, and all the Meteors preach a Deity. The *Air* is the necessary

* About A. D. 1284.

cessary but noble Instrument of Man's Subsistence in the World. We breathe by it, and so it is the most necessary of all the Elements, because without Respiration there is no Life. The * Greek word which signifies *to breathe* hath but two Letters, and those are the first and last of the Greek Alphabet. The Air or Breath by which we breath is our *Alpha* and *Omega*; we began our Life with it, and we end it without it: For this is that whereby the Fuel of Life is at first kindled and afterward maintained. This also was made to transmit to us the Light, Heat and Influences of the Sun and Stars, and is the Medium and Conveyer of Colours to the Eye, and of Sounds to the Ear, and is the Vehicle of all wholesom Smells, of all fragrant and delightful Odours for the Refreshment of our Spirits. This is of perpetual use to all Creatures whether Vegetative or Animal. And if we would be Curious we might observe here the *Elastick* Power or *Spring* of this Element, the native Self-Expansion of this vast Body, whereby it flies out and seeks to be at Liberty upon the removal of all Circumambient Obstacles: Which a Noble Philosopher of our Age hath improved to very good purpose, and therein discover'd the Wonders of the Creation.

The

The *Winds* are the Stream and Current of this Element, and are caused by the Condensation and Rarefaction of it, which are procured by a lesser or greater degree of the Sun's Heat. But sometimes this Boisterous Meteor is bred by Vapours and Exhalations rising out of the Earth or Waters, and then generally it is most vehement and loud, it is most swift and rapid, on which latter account we have mention of *the Wings of the Wind*, Psal. 18. 10. But both the gentle Gales and stormy Blasts are useful at their several Seasons, *viz.* to fan, clear and purge the Air, and to prevent the stagnating of it, to dispel unwholesome and noxious Vapours, especially at Sea, and in very wet Soils; to dry up excessive Moisture after great Rains, to qualify the scorching Heat of the Summer, to cool those Regions which are most liable to the Sun's perpendicular Rays (and accordingly it is well known that there are *Breezes*, *i. e.* fresh Eastern Winds which constantly blow about Noon in the hottest Countries, even under the Equator, and mitigate the excessive Heat). They are welcome and refreshing to Trees and Plants and Fruit, both as they bring Rain to water them, and fair Weather to ripen them. They are serviceable at Sea for Ships, yea of such necessity that Navigation could not be performed without them. And they are useful for several considerable Purposes at Land,
for

for the Needs of Man's Life. The Winds therefore may be reckon'd as no contemptible Instances of God's Care and Providence toward Mankind. Whence these are attributed to Him alone by the Inspired Prophet, * *He bringeth forth the Wind out of his Treasures*; the Treasures of Sea and Land that afford a plentiful stock of Exhalations, which being either rarified by Heat, or condens'd by Cold, stir and move in that manner which we either feel or hear. *He makes the Weight for the Winds*, as it is elegantly said of him *Job 28.25*. There is such a certain Order and Appointment concerning every one of them, (whether they be the *Cardinal* Ones from the Four Quarters of the World, or those that are Intermediate and Collateral) that they may be said to be *weighed* and *poized*. They are always in such a Posture as he pleaseth, and their Place and Motion together with the Effects of them are exactly determined.

Let us behold the *Clouds*, the visible and constant Witnesses of an Almighty Power and Wisdom. They are moist Vapours drawn up and thickned into Water in the middle Region of the Air: therefore they are call'd *the Waters above the Firmament*, *Gen. 1.7*. *i. e.* above the great *Expansum* of the Lower Region of the Air (for there is another Firmament

* Jer. 10. 13.

mament mentioned, *Gen. 1. 17. the Firmament of the Heaven, or Æther, where God placed the Stars*). So that if we distinguish between the *Aerial* and *Æthereal Firmament*, (which we ought to do) we shall reconcile the Controversy which hath been among Writers concerning the *Rakiang*, the *Expansum* mentioned by *Moses*, *which divided the Waters that are under it, i. e. the Sea, from the Waters that are above it, i. e. the Clouds*. The not observing of this hath occasioned that vile Notion which we find vented by the *Archæologist*, who tells us, * *That Moses makes Waters above the Heavens or Firmament, to comply with the vulgar Conceit of the People, that God Almighty hath a Store-house of Rain there, and so sends it down thence to them on the Earth*. I am heartily sorry to see such ill Words fall from the Pen of a Christian Writer. They not only import that *Moses* willingly and designedly fosters the People in their erroneous and false Apprehensions concerning God's Works, but they make a Mock of a plain Truth, *viz. that the Heavens or Clouds are the Receptacles or Store-houses of Rain, and were appointed by the All-wise God to be so. The Heaven is expressly call'd God's good Treasure (or rather Treasury) whence he gives Rain, Deut. 28. 12. And we read of the Treasures of*

* *Archæolog. Philos. cap. 8.*

of Snow and Hail, Job 38. 22. (We should rather translate it *Treasures*, as the same Hebrew word is render'd in *Psal.* 135. 7. where also it is apply'd to a *Meteor*, as it is here). And what are these *Treasures* and *Store-houses* of Rain, Snow and Hail, but the *Clouds*, from whence these *Meteors* descend? And these *Clouds* (as any impartial and considerate Man must needs grant) are *the Waters that are above the Firmament*, or Aerial Heaven. So little reason had the foresaid Writer to look upon these as the mere Imagination of the *Vulgar*, and to think that the Inspired Penman makes mention of them in mere Compliance with the conceited People. Whereas it is rational to believe that the Chapter wherein this Passage occurs is a plain Narrative of what was done at the Creation, and therefore we are to understand it in a Literal and Historical Sense. And we are told by * One who was as great a Judg in this Case as any that can be named, That *although Moses in this Chapter treating of the Creation of the World doth not unlock the Secrets of Astronomy, because he writes to a People that understood not those things, yet he delivers nothing here but what may be granted by Astronomers themselves.* This was the Determination of that Noble Dane, that Wise Philosopher and Mathematician,

* Tycho Brahe in Epist.

tician, and it is a smart Rebuke to our *New Antiquary* in Philosophy. We may then, notwithstanding what he hath vainly suggested, admire the Divine Providence in placing *those Waters above the Firmament*, and we may reckon them as a singular Contrivance of the Omnipotent and Merciful Creator. To supply which constantly *he causeth the Vapours to ascend from the ends of the Earth*, Psal. 135. 7. to be drawn up from all the farthest parts of the World for this purpose.

And when they are mounted up into the Skies, he admirably poizeth them, so that they fall when and where he pleaseth. A late Ingenious Philosopher tells us of an Instrument whereby we may know the *Weight* (*i. e.* the degrees of Gravity and Levity) of the Air, Clouds and Winds. But we are certainly informed from the Infalible Writings that this is effectually done by an Almighty Hand; *He not only makes the Weight for the Winds, but he weigheth the Waters* (*i. e.* the Clouds) *by measure*, Job 28. 25. Accordingly you read of *the Ballancing of the Clouds*, Job 37. 16. which is reckoned as *the wondrous Work of Him that is perfect in Knowledg.* Whence some of the Hebrew Doctors have thought the Word *Shamajim* (the *Heavens*) was derived from *Shaak obstupuit* and *majim aquæ*, to express that particular Region Above where these *Waters* hang in that *stupendous* manner.

Though

Though I do not take this to be the genuine Etymology of the Hebrew Word, for it is most probable it had its * Name only from the *Waters* (*i. e.* the Clouds) being *there*; yet this Derivation rightly suggests to us, that if we duly consider this Wonderful Ballancing of these moving Bodies, we cannot but stand *astonished* at these Divine *Statics*, and admire the Hand which gives them that exact Libration. A great Naturalist takes special Notice of this, and cries out, † *What is more Wonderful than the Waters standing in the Air?* He might have said, *so many Seas hanging in the Air?* These he thought to be an *Extraordinary* Work, and this we know to be a *Divine* one. The Clouds therefore are in a Poetick way stiled *God's Paths*, Psal. 65. 11. his *Chariots*, Psal. 104. 3. his *Chambers*, ver. 13. because he acts and converses, and shews himself here, because his Presence and Providence are signally discover'd in them, and by them. These are emphatically call'd the *Water-spouts of Heaven*, Psal. 42. 7. because they pour out Water like *Pipes* or *Spouts*, for when those condensed Vapours (being now turn'd into Clouds) become too ponderous for the Air to bear them, they fall down in *Rain*. These Clouds therefore are fitly and elegantly

G call'd

* Shamajim à Sham ibi & majim aqua. † Quid mirabilius
 æquis in coelis stantibus? Plin. Nat. Hist. l. 31. c. 4.

call'd *dark Waters*, Psal. 18. 11. because being thick and full of Water they become black: and besides, from the gathering together and condensing of these Clouds the Earth is shadowed and darkned. But this proves generally a Comfortable Darknes, being in order to *Rain*, which soon restores Light again.

But *this* also is produced by the singular and extraordinary Direction of God: for tho we grant that these vast Heaps of Water fall by their own Weight, or by the Violence of Winds which thrust them downwards, yet it is from the particular Care and Guidance of the Almighty that this is done: Which we find taken notice of by *Job*, a Great and Skilful Observer of God's Works, *Job* 26. 8. *He bindeth up the Waters in his thick Clouds, and the Cloud is not rent under them.* That the thick and heavy Clouds, so loaded with Waters, do not break presently, but hang and hover between Heaven and Earth a considerable time (as frequently we see them do) is very wonderful, and is to be ascribed to the Divine Power and Wisdom. To which it is to be attributed also, that they fall so lightly, and not all together. It is from this most wonderful Disposal that these vast heavy Bodies do not fall down upon us at once, and all in a Heap, and so crush us with their Load. This very thing *Job's Friend* (who by his Discourse we may perceive was

a Man of some Philosophy as well as great Piety) particularly insists upon with the highest Admiration; *Job 36. 27. He maketh small the Drops of Water*, which the LXX not minding so much the very Words as the Sense, (as is common with them) render very finely * *the Drops of Rain are numbred by him*; he is so careful in distributing them that he divides them out by Tale: so exact is he in measuring out the Rain, that he uses as it were an Arithmetical Proportion. These Waters are with great Accuracy dispens'd to Mankind; *they* (as it immediately follows) *pour down Rain according to the Vapour thereof*, according to God's disposing and parcelling out of the Vapours which are the Matter of the Clouds, for here he doth as it were use an Arithmetick. Whence it is that they dissolve into Showers by degrees, and gently distil upon the Ground in Drops, as a Gardiner waters his Garden. Not but that in some Places, as in the Southern Regions of the World, (as *Guinea, Brasil, Egypt*, the Country of the *Abyssines*) the Rains fall in greater Quantity: which is a great Argument of the Divine Providence; for those Parts of the World want more Rain, and therefore the Drops are bigger and more ponderous, and the Showers fall faster and thicker, and with much more Force: but

G 2

still

* Ἀριθμῶνται αὐτοῖς, &c.

still they descend orderly and by degrees. And that we may be the more apprehensive of this Benefit, God sometimes permits Examples of the contrary, as those Fallings of Waters in the *Indies* which they call *Spouts*: The Clouds fall down *altogether*, and like a violent Torrent. They are not *Showers* but *Floods* of Rain that come down from the Skies. But this is rare and extraordinary, and serves only to commend the constant Goodness of God in the ordinary dispensing of Rain. Therefore it is said, *He made a Decree for the Rain*, Job 28. 26. It was a peculiar Appointment and Ordinance of Heaven, that there should be this Admirable *Filtration* of the Clouds, which is a thing very amazing and stupendous. It is no wonder then that it is reckon'd among *the Great, Unsearchable, and Marvelous things which God doth*, Job 5. 9, 10. and that He himself calls upon us to admire him as the sole Author and *Father of Rain*, Job 38. 25, 26, 27, 28. and that this is owned to be the peculiar Work of the Almighty *Jehovah*; Jer. 14. 22. *Are there any among the Vanities (i. e. the Idols) of the Gentiles that can cause Rain? or can the Heavens (of themselves) give Showers? Art not thou he, O Lord God?* The Old Jews express'd their Sentiment concerning it thus, *One of the Keys proper to God, and kept in his own Hand, is that of Rain*: thereby reckoning it a singular

lar and immediate Gift of the Almighty. And they used to join it with two other *Keys*, viz. of giving Life, and of Raising from the Dead, which shews that they thought it peculiar to God alone.

And then the known *Usefulness* of this Blessing is an Argument of its Author. This is with great Elegancy set forth by the Inspired Poet; *Psal. 65. 9. Thou visitest the Earth, and waterest it: thou greatly enrichest it with the River of God, (i. e. the Clouds or Rain) which is full of Water: thou preparest them Corn, when thou hast so provided for it (by vouchsafing seasonable Showers:) thou waterest the Ridges thereof abundantly: thou settlest the Furrows thereof: thou makest it soft with Showers; thou blessest the Springing thereof: thou crownest the Year with thy Goodness, and thy Paths (the Clouds wherein God is Poetically said to walk, Psal. 18. 9.) drop Fatness: They drop upon the Pastures of the Wilderness, and the little Hills rejoice on every side. The Pastures are clothed with Flocks: the Valleys also are cover'd over with Corn: they shout for Joy, they also sing.* This they do, thus they behave themselves, being as it were drunk with the *Bottles of Heaven*, (as the Clouds are call'd *Job 38. 37.*) being abundantly satisfied with * *Joresb* and *Malkosh*, the former and the latter

G 3

Rain:

* Deut. 11. 14. Joel 2. 23.

Rain: the first of which is necessary after the Seed is sown; the second before Harvest to set it forward, to fill the Ears. Wherefore St. Paul proves a God from the Clouds, *Acts* 14. 17. *He left not himself without Witness, (i. e. of his Divine Power and Providence) in that he gave us Rain from Heaven, and (as the Consequent of that) fruitful Seasons.* For it is this Celestial Water that makes the Ground fruitful: it hath a peculiar Faculty to do it, and no other Water doth the like. Thence that Talmudick Saying, *Rain is the Husband of the Earth*, because it impregnates it, and makes it fructify. Therefore *Show-ers* are rightly call'd by Pliny, * *the Food of Plants*, the Meat as well as the Drink of all Vegetables. But this is effected by the Divine Blessing, and is a singular Testimony of God's Care of the World. Thus from the *Earth* we prove there is a God in Heaven: even from the Grounds and Fields refresh'd with Rain, and thereby made fertile, we argue a Divine Benefactor.

And now when I am speaking of the *Clouds* I must not forget the *Rain-bow*, which is a Party-colour'd Cloud, whose fine and gay Paintings are the various Reflection and Refraction of the Sun's Beams in that watry Substance. This gaudy Mixture of Light and
Shade

* Cibus arborum imber. Nat. Hist. l. 17. c. 2.

Shade arises naturally from the Difference of the Superficies of those Parts that constitute the Cloud, and therefore without doubt it appear'd before the Deluge, though we find it not mention'd till afterwards, when it was appointed to be set in the Skies as a *Sign* of a * *Covenant* between God and Man: and ever since it hath continued (and shall so to the last Period of all things) a visible Token and Assurance of God's good Will to Mankind. Wherefore as often as we view this Cloud, made so remarkable by the Diversity of its Colours, the Variety of its Tinctures, let us thence be confirm'd in our Belief of a God, and look upon this Beautiful Spectacle as an illustrious Symbol of the Divine Mercy and Beneficence. Or, to speak in the Words of the Wise Son of *Sirach*; *Look upon the Rainbow, and praise Him that made it. Very beautiful it is in the Brightness thereof: It compasseth the Heaven with a glorious Circle, and the hands of the most High have bended it, Ecclus. 43. 12.*

To the *Clouds* belong *Thunder* and *Lightning*, and therefore may pertinently be spoken of here; for when a Cloud breaks asunder by reason of hot and dry, sulphureous and nitrous Vapours enclos'd and compass'd about with cold ones, and so set on Fire, and consequently

* Gén. 19. 13.

frequently extending themselves, and violently making their way, the Noise caus'd by this Rupture is that which we call *Thunder*, and the flashing out of the Fire is *Lightning*. Both which are comprehended in those Words, *Psal. 29. 7. The Voice of the Lord divides the Flames of Fire.* And the former of them is call'd *the Voice of the Lord upon the Waters*, ver. 3. This is no other than his Thundring in the *Clouds*, which usually turn into *Rain* when they are broken and scattered. And perhaps to this may refer ver. 10. *The Lord sitteth upon the Floods*, i. e. upon the *Clouds*, which are justly stiled *Floods*, because of the abundance of Water contain'd in them. And as Thunder is bred by Fire and Water in the *Clouds*, so the Effects of it are of the like Nature, for Lightning and Rain generally accompany the Thunder. Wherefore we find this particularly taken notice of by the Pious Observers of Providence: *He maketh Lightnings for the Rain*, *Psal. 135. 7.* *He maketh Lightnings with Rain*, *Jer. 10. 13.* And this is mentioned in *Job 37. 2, 5. & 38. 25, 26.* and not without great Reason, for herein the Goodness and Mercy of God are seen, because *Rain* is serviceable to connect and qualify the Thunder, and by its Moisture to prevent the Hurt which otherwise might be done by the scorching Flashes which attend it. Who is not sensible that Thunder is the more signal
Ope-

Operation of a Divine Cause, and therefore is so frequently call'd *God's Voice*? as in *Exod.* 20. 18. *Psal.* 18. 13. & 77. 18. *Jer.* 10. 13. Yea, no less than seven times in the 29th Psalm it is call'd *the Voice of the Lord*: Which may not only signify a *Great and Loud Voice*, (for the Voice or Noise of Thunder is such, especially in some Regions of the World, as in some Parts of *Africa*, and in the Southern Countries of *Asia* and *America*, where it is much more Terrible than it is among us; yea, as a * Learned Gentleman observes, it as much exceeds the Thunder of these *Northern* Climes as the Heat there exceeds that of these) but it more particularly denotes the Wonderful *Author* of it, viz. the Almighty Being.

Which was the very Apprehension of some Men of the deepest Philosophy among the *Gentiles*. Even they acknowledg'd this Fierce Meteor to be the Effect of no less than an *Extraordinary* and *Divine* Power. *Plutarch* informs us, that some of the Best Philosophers made it the Matter of their Wonder and Astonishment, that † *Flames* should proceed from watry Clouds, and that such a Harsh Noise should be the Product of that Soft Matter. I find a Great Natural Philosopher taking notice

* Dr. Woodward, Nat. Hist. of the Earth, Part 4. † Πάντων ἀπρόσπατον ἐκ μὲν ὑγρῶν φλόγας, ἐκ δὲ μαλακῶν νεφελῶν τόπος σκληρὸς ἀναδιδόμενος. *Sympos.* l. 4. quest. 2.

notice of the * falling down of the Lightning from Heaven as a Wonderful thing, because Fire naturally ascends. It seems he did not think that the Motion of it downwards is sufficiently solved by the Violence of the Rupture, for else he would not have imputed it to a † *Divine Virtue*, as he doth. And more fully and expressly in another place he declares his Mind thus, || The Effects of Thunder, if you consider them well, are of that Wonderful Nature that we cannot possibly doubt but that there is a Divine Subtile Power in them. And then he proceeds particularly to reckon up the Strange *Phænomena* of this sort of Meteor; which indeed are very Surprizing and Amazing, and would be thought altogether incredible if several Other Writers of good note had not attested the same, and if at this very day we had not Instances of the Truth and Reality of them. This Naturalist adds further, that Thunder is made partly to Scare and Affright the World: This Terrible Noise, saith he, was for this purpose, *viz.* ||| *That we might stand in awe of something above us.* Horace confesses that

* Ignis suâ naturâ in verticem surgit, & si nihil illi prohibeat, ascendet: fulmen autem cadit eâdem necessitate, quâ excutitur. Senec. Nat. Quæst. l. 2. c. 58. † Nihil itaque dubii relinquitur quin Divina illi virtus insit. Ibid. || Mira fulminis, si intueri velis, opera sunt, nec quicquam dubii relinquencia quin Divina insit illis & subrilis potentia. Nat. Quæst. l. 2. c. 31. ||| Ut supra nos aliquid timeremus. Lib. 2. cap. 42.

that he felt this in himself, he acknowledges that this Voice from Heaven made him disown *Epicurus's* Notions, and repent of all his *Atheistical* Principles and Practices: See *Lib. 1. Ode 34.* It is a very Remarkable Example, and I heartily wish that the Wild Sparks of this Age, who are very well pleas'd with other Parts of this Author's Writings, and are ambitious to imitate him, would seriously read and consider of this, and thence (with their Brother Poet and Pagan) be induced to assert a God and Providence in the World. It is not to be denied that sometimes by this Dreadful Sound God is pleased to rouse and alarm the careless Part of Mankind, and sometimes to give Proof of his Judicial and Avenging Power. Moreover, by this is discovered his *Goodness* to Mankind, for this Violent Shaking of the Air is of great Use to us, because it corrects or dispels its noxious Qualities, and renders it pure and wholesom. By means of this are convey'd to us Showers of Rain, which most seasonably cool that Element as fast as the Fulgurations heat and inflame it.

Then, as for the *Colder Meteors*, they have their proper Use for which they are generated. *Snow* is a dissolved Cloud that is somewhat condens'd in its coming down, and therefore falls in light Flakes, like the scatter'd Pieces of a *Fleece*; whence it is said, *He giveth Snow*
like

like Wool, Psal. 147. 16. To which it is compared because of the Configuration of its Parts, and because of its Whiteness and Softness; nay, I must add, because of its Warmth. This last is thus express'd in few words by *Theophrastus*, * The Snow produces a Fermentation in the Earth by shutting in the Heat upon it, which the Earth takes into it self, and is thereby made strong and hearty. The Husband-man who inters his Seed in hopes of its rising again, delights to behold this Winding-Sheet upon it; he rejoices to see it thus buried in Woollen, because he knows that this is a Safeguard to it, and shelters it from the Winter-Winds and Storms: This keeps both the Earth and the Grain warm, and preserves the Blade fresh and verdant; and afterwards when it dissolves, it kindly moistens them, and is a Preparative to a farther Fermentation.

Hail is such another dissolved Cloud as *Snow*, but much more thickned and hardned by the lower Region of the Air as it comes down through it. The *Treasures* of this Congealed Rain (for so I may call it) are mention'd by God himself, *Job* 38. 22. which he saith *he hath reserved against the time of Trouble, against the day of Battel and War*, ver. 23. Then

* Τὴν γῆν ἀναζυμοῖ συγκατακλείουσιν καὶ ἐναπολαμβάνουσιν τὸ θερμόν. De Plant. l. 2. c. 2.

Then this Weapon is brought forth, and is of singular Use to punish Offenders ; and accordingly we read that Armies have been defeated by it, *Josb. 10. 11. Isa. 30. 30.*

Frost and *Ice* are other Cold and Watry Impressions which God owns himself the Author of ; *Job 37. 10. By the Breath of God* (i. e. by a Cold Sharp *Wind* which *He* sendeth) *Frost is given, and the Breadth of the Waters is straitned*, is so contracted and congeal'd, that they flow not, they spread not themselves as usually. In very significant and apposite Terms, but very briefly, this is described in *ch. 38. 30. The Waters are hid as with a Stone, i. e. the Waters in Ponds and Rivers, and in some Parts of the Sea, are covered with Ice which is hard, and as 'twere Stony, and may be call'd a Pavement of Ice.* That this and the like Operations of the most High are of considerable Use in the World (beside what hath been mention'd before) we gather from *chap. 37. ver. 12. They are turned round about by his Counsels, that they may do whatsoever he commandeth them upon the Face of the World in all the Earth: i. e. all the World over they are made use of in their several Vicissitudes to effect the wise Designs and Purposes of God.* And *ver. 13. He causeth it to come, whether for Correction* (i. e. the Punishment of Men) *or for his Land, (i. e. more universally for all Creatures, particularly the* Ground

Ground or Earth) or for *Mercy* (*i. e.* in a way of Blessing). It were easy to give Instances of all these, for Histories readily furnish us with them. So in another Place of this Book, *ch. 36. v. 31.* where the foregoing Discourse had been concerning the *Clouds, Rain, Lightning, &c.* it is said, *By them he judgeth the People, i. e.* to some they are made use of for Punishment; *and he giveth Meat in abundance, i. e.* to others they are sent for Good, for their real Benefit and Advantage, and more particularly they are someways instrumental towards the procuring of Fruitfulness and Plenty, call'd here *Meat*.

I had almost forgot to mention *Dew*, which is of great Advantage, especially in the *Eastern Countries* which are hot, and where little Rain falls. It is by the singular Care of the Divine Providence that they have very *Great Dews*, which are hugely beneficial to the Earth. Therefore you find these taken notice of as a particular Largess of the Divine Goodness; *Job 38. 28. Mic. 5. 7.* and in several other Places. Thus much concerning the *Lower Heavens* or *Atmosphere*, that is, the Space between the *Ethereal Heavens* and the Earth, and the several things which are Observable in it, as the Air, Winds, Clouds, &c. all which proclaim a Wise, Powerful, Just and Merciful Deity.

C H A P. V.

The Frame of the Earth argues a Godhead. A particular Account of the Torrid Zone, and of the two Temperate, and two Frigid Zones: especially the two latter are shew'd to be Testimonies of Divine Providence. The present Position of the Earth is the same that it was at first, whatever the Theorist (who confutes himself) suggests to the contrary. Against him it is proved, that the Shape of the Earth at this day is not Irregular and Deformed; and that the Primitive Earth was not destitute of Hills and Mountains. These are of considerable Use. The particular Advantages of them are recounted, and thence the Wise Disposal of the Creator is inferr'd.

NOW let us pass to the *Earth*, that Part of the World where we are placed, where the visible Footsteps of a Godhead are easily to be traced. The Frame of this *Spacious Round*, (for this Figure of it is proved from its Shadow cast upon the Moon in an Eclipse, which shews that the Earth and Sea make one round Body, for the Shadow renders the true Form of the Body which causeth it ;) the Frame, I say, of this *Spacious Globe* is excellent and astonishing if we contemplate the

the Hills, Valleys, Lakes, Rivers, Rocks, Promontories, Woods, Islands, Peninsula's, Continents, of which 'tis composed, the Mixture of which renders it not only useful but beautiful. Nature proceeds not always in the same Track and Path, but (as *Philo* observes) * delights in the Variety and Diversity of its Artificial Works. And the wonderful Skill and Art of the Author who framed them thus are to be admired. But more especially the Diversity of the *Situation* and *Position* of the Earth is remarkable. It was the Wise Contrivance of the Creator to place it in that Oblique Posture that it is now in, it being most convenient for the Good of Mankind: *He that made of one Blood all Nations of Men, to dwell on all the Face of the Earth, hath determined the Bounds of their Habitation, Acts 17. 26.* Hence there are Different Zones (as they are call'd) into which the Earth is divided.

There is first that which is call'd the *Torrid Zone*, because the Influence of the Sun is very vehement and active in this Part of the World: but this is no Hindrance to its being Inhabited, as some of old vainly fancied. This is all that Space of Earth which is between the two *Tropicks*. But there is a great Latitude

* Ἡ δὲ φύσις χαίρει τῷ πολυτρόπῳ καὶ πολυχρῆστῳ ὁπλισμῷ καὶ ἔργῳ. De vitâ Mos.

tude as to the Inhabitants of this Zone, for some of them live directly under the *Equator*: And these only, of all the Dwellers on the Earth, have a Right Sphere, and always have an *Equinox*, *i.e.* their Days are exactly 12 Hours in length, and so are their Nights, neither more nor less. They have the peculiar Privilege to see both the *Poles* at the same time: And all the *Fixed Stars* rise and set to them. They have 2 Summers and 2 Winters in a Year, the Sun going directly over their Heads twice a Year, *i.e.* when he is in *Aries* and when he is in *Libra*, so that their 2 Summers are then; and their Winters are when the Sun is in *Cancer* and *Capricorn*. Thus are situated some parts of the *East Indies*, and some part of *America*, and the *Islands of Sumatra*. And though they are so liable to the Perpendicular Rays of the Sun, yet by the special Providence of Heaven it happens that the Inhabitants of these Hot Countries have Cool Breezes that constantly fan and refresh them in the Afternoons, and their Nights are both long and cool, which makes amends for the excessive heat of the Day. Other Inhabitants of this Zone are seated between the *Equinoctial* and the *Tropicks*, and these likewise have a double Summer and Winter, only their Days and Nights are more unequal than those under the *Equinoctial Line*. Thus are situated the *Philippine* and *Molucca Islands*,

part of *East India* in *Asia*, *Ethiopia* in *Africk*, *Mexico* in the North of *America*, and *Peru*, *Brasil*, *Guinea* in the South of it. And it is well known that there is not a more temperate Region than *Peru* in the World, the Nights cold tempering the Days heat, and Rains being frequent, and cool Winds blowing constantly. Again, there are others of this Zone that live right under the *Tropicks*: These have but one Summer and one Winter in a Year, and their Situation is very convenient, and upon several accounts desirable. Before I leave the *Torrid Zone*, I will take notice of a very Remarkable Thing which Travellers of good Credit inform us of, *viz.* That in most Places belonging to it there are vast Exhalations constantly from the Earth, which are condens'd into moist Vapours, and though they seldom fall in Rain-Showers yet they affect the Region of the Air which is under them, and render it very moist in the Day-time, and in the Night very cool and fresh. And this abundant Mass of Vapours caus'd by the excessive heat of those Countries affords matter for *Dews*, which are exceeding plentiful and copious, so that they serve instead of Rain-Waters, and are of great use for the Fertility of the Ground and Plants.

But *Secondly*, There are 2 *Temperate Zones*, which lie between the *Tropicks* and the *Polar Circles*: the one between the *Tropick* of *Can-*

cer and the *Artick Circle*, the other between the *Tropick of Capricorn* and the *Antartick*. It is the peculiar Lot of the People that dwell in these parts of the World to have 2 *Solstices* and 2 *Equinoxes* in a Year; but one Summer and one Winter, and the Sun is never vertical over their Heads. They have an Oblique Sphere, as all have besides those that live under the *Equator*. We in *England* are situate in this Parallel; so is all *Europe*: yea the greatest part of the habitable World is in the Northern Temperate Zone. It was the pleasure of the Great Founder of the World that this part of the Earth should be the Principal Stage of Action: It was his Will and Appointment that this should be the Seat of the greater and better part of Mankind.

There are also two *Frigid Zones*, the one between the *Artick Circle* and the *North Pole*, the other between the *Antartick Circle* and the *South Pole*. The Inhabitants are of three sorts, 1. Those who live under either of the Polar Circles. Those that inhabit under the *Artick Circle* have one Summer and one Winter in a Year. When the Sun is in *Cancer*, their Day is 24 Hours long, and they have no Night: And when the Sun is in *Capricorn* their Night is 24 Hours long. Under this Parallel are *Lapland*, *Finmark*, part of *Russia*, *Iseland*, &c. And here it might be observ'd, as a Testimony of a singular Providence, that

these Countries which are extreme Cold are furnish'd with the largest *Wood*, and the most and best *Furs*. 2. Those that dwell between the *Polar Circles* and the *Poles* have sometimes continual Day and no Night. From the Sun's being in *Cancer* their Day is in some places a Month long, in others two; and the farther they live toward the *North* the longer are their Days, till you come under the *North Pole*, where it is half a Year long without Night. In the other half of the Year, beginning when the Sun is in *Capricorn*, the Nights exceed proportionably, and last a Month, two Months, &c. In this part of the World is *Nova Zembla*, *Green-land*, &c. 3. Those that live right under the *Poles*; and these only (of all the Dwellers on the Earth) enjoy a Day that continues six Months compleat, which is succeeded with a Night that lasts as long: So that they may be said to have but one Day and one Night in a Year. By reason of this latter the Countrey is so cold and dark that it is not inhabited in this part of the Year.

But as for the *other* Places before-mention'd where there are long and cold Winters, there is reason to believe that they are most futable to the Constitutions and Tempers of the Persons who inhabit them. The great Disposer of all things placed such Inhabitants there as were fit for that Region, and no other: For
they

they could not dwell in these Countries where we inhabit, as we could not dwell there. So that the placing of those People in that dark, cold and frozen part of the World, is so far from being a Detraction to Divine Providence, that it is a singular Proof of it, and shews the Wisdom of the World's Maker, in a suitable choosing of Places for Persons according to their particular Temperament and Exigencies.

And both with relation to these and the *Polar* Regions we may truly say that the excessive Coldness of these Parts is useful and serviceable for the good of others that are near to the Sun, and have need sometimes of cooling. From these remote Treasuries the *Winds* are fetch'd for the rebuking of the scorching *Heats* of Summer; of which we can give no Natural and Philosophical Account, unless we derive them from these great Store-Houses. This acquaints us with the true cause of that excessive Sharpness and Rigour of the Air which we feel sometimes, and that of a sudden. This solves the unexpected change of Weather, yea sometimes the sudden and unlook'd for checking of Pestilential Diseases and Infections which is known to happen. Inconsiderate Minds are apt to think that the Regions that are seated under the *Poles* are altogether useless, and thence perhaps may be tempted to question the Divine Conduct.

But if we will consider those Places, we shall find that they are as Necessary as any parts of the World. It is true, they are for the most part Unhabitable, but their being so makes others Habitable, for these are the common Receptacles of Cold, whence it is dispersed by Divine Providence to those Parts where it is wanting at any time, that is, when the Sun's Fierceness calls for a Check. And several other ways those *Polar* Receptacles and Nurseries of Cold are serviceable, yea necessary for the welfare of the World.

Lastly, The wise framing and ordering of the Sun's Motion and Progress (of which I have spoken before) necessarily infer this Difference of Places on the Earth as to Heat and Cold. Unless we will remove this Luminary from its *Ecliptick*, and thereby disorder the whole Course of the World, and destroy the various Succession of Times and Seasons which upholds Mankind as well as all other Creatures whatsoever; we must be forced to confess that the several *Zones* and *Climates* (tho differing so much in Heat and Cold) are useful in the Creation, and that the Position of the Globe of the Earth is most wisely and discreetly ordered.

The late *Theorist* boldly contradicts this, and tells us that the Situation of the Earth is not the same now that it was before the Deluge. It did not stand Oblique to the Sun, as
it

it doth at present, whereby we have a great Difference of Seasons, as Spring, Summer, &c. but it had a right or parallel Situation, inso-much that there was a Continual *Equinox*. And yet this Person, who is so curious about the Idea of his *First Earth*, hath given it us with a very great Blemish, yea much worse Fault than any that he pretends to find in this present Earth; for they are his exprefs Words, * *The Paradisiacal Earth had a Torrid Zone, which was Uninhabitable*. All this great Portion of Earth was burnt up and wither'd, and had no Grass, Tree or Plant upon it, and so no Creature could find any Sustenance there. This is his fine *Paradisiacal Earth*, as he calls it. And yet it is worth our observing that he saith in another Place in exprefs Terms, * *All the Earth is green, and a Perpetual Spring is over it all*, meaning his *Paradisiacal Earth*. When he hath thus confuted himself, there is no need of any Body else to do it. But we may grant him his Theory, that there was a Primitive Earth of a different Form from the present. It is partly true that the Earth is not what it was, for there are the Marks of *Sin* and of the *Fall* even on the Earth, and we read of a *Curse* denounced against it, *Gen.* 3. 17. (though he is pleas'd to turn that Chapter into mere Allegory, and thereby to

* Theory of the Earth, Book 2. † Chap. 1.

null the main Points of our Religion): and afterwards by the violent Irruptions of the Flood it is most probable that the Earth underwent some Alteration. But what is this to the changing the very Situation and Posture of the Earth? How is it proved hence that the First Earth had another Situation to the Sun, and had a perpetual Equinox and Spring? These things are asserted by him, but no where proved. Wherefore I look upon it as a precarious and groundless Opinion.

The Variety of Seasons before the Flood may be gather'd from *Gen. 8. 22. I will not again curse the Ground, nor smite any more every living thing as I have done. While the Earth remaineth, Seed-time and Harvest, and Cold and Heat, and Summer and Winter, and Day and Night, shall not cease.* As much as to say, Though during the time of the Deluge these Alterations of the Seasons were interrupted, and the Sun's Heat and Light were as if they were not, because they could have no Effect upon the Earth as long as it lay under Water, yet now having restored things to their *pristine* Course and Order, I assure you they shall continue so to the end of the World. Thus it is included in these Words, that there were the same Vicissitudes of the Year before the Flood that there are now. And this appears to be a Truth from what I have already shew'd, *viz.* that the present Position and Situation of the Earth

Earth are very convenient, useful, and in some Respects necessary : for there is a necessity of a Vicissitude of Seasons, and a Variety or Exchange of Heat and Cold, because the Fruitfulness of the Earth depends upon these ; and Heat and Cold generated in the Air are the two Hands of Nature, (as my Lord Bacon rightly saith) by which she doth all her Work. It is unreasonable to conceive an *Equality* of these, and consequently an Equal and Unvariable Temperature of the Year before the Deluge : Which is thus lately represented by an Admirable Pen ; “ A Man
“ can hardly at first imagine what a Train of
“ ill Consequences would follow from such a
“ Condition and Posture of things : of which
“ it would not be the least, that such a Mediocrity of Heat would deprive the World of
“ the most beautiful and the most useful Parts
“ of all the whole Creation ; and would be
“ so far from exalting the Earth to a more
“ happy and Paradisiacal State, that it would
“ turn it to a general Desolation, and a mere
“ barren Wilderness, to say no worse. Such
“ an Heat would be too little for some sorts
“ of Vegetables, and too great for others.
“ The more fine and tender Plants, those
“ which will not bear a Degree of Heat beyond that of *April*, would be all burnt up
“ and destroy’d by it : whilst it could never
“ reach the more lofty and robust, nor would
“ there

“ there be near Heat enough to ripen their
 “ Fruits, and bring them to Perfection. No-
 “ thing would fute and hit all, and answer
 “ every End of Nature but such a Gradual
 “ Increase and Decrease of Heat as now there
 “ is. He adds, that if he should descend to
 “ the *Animal World*, the Inconveniences
 “ there would be as many and as great as in
 “ the *Vegetable*: and such a Situation of the
 “ Sun and Earth as that which the *Theorist*
 “ supposes, is so far from being preferable
 “ to this which at present obtains, that this
 “ hath infinitely the Advantage of it in all
 “ Respects. Thus the * Learned Dr. *Wood-*
ward. Therefore the *Perpetual Equinox* of
 the *Theorist* is but a Fancy, and we have
 ground to assert that the Situation of the
 Earth is the same that it was at first, and
 that the Year had the same Seasons, Changes
 and Revolutions that it hath now, and that
 all these are Attestations of the *Divine Wis-*
dom in making the World.

The said *Theorist* tells us also, that the
 Earth had no *Inequalities* on its Surface at
 first, but was as smooth and plain as a *Die*
 (only this is square, and that was round).
 And as for the Earth which we now have,
 he declares that there is no Shape nor Beauty
 in it, yea it is Rude, Indigested, Irregular,
 Mon-

* Nat. Hist. of the Earth, Part 6.

Monstrous. It is but the Rubbish of what was before: In short, he saith, 'tis nothing but Ugliness and Deformity. It seems, according to this Gentleman, it is a *Chaos* again. But all the Wise Heads in the World have had other Apprehensions of it. The most accurate and nice Judges of Beauty never thought it was a Deformed Mishapen Lump. They never dreamt that Sea, and Rocks, and Mountains rendred it Ugly and Monstrous, as this Author positively avers. They rather thought that the Variety of Mountains, Plains and Valleys, &c. makes it more grateful and comely than if it were all even: they thought that this Diversity of its Parts was Ornamental. And so without doubt it is, and consequently the Form of this present Earth (whatever this *Theorist* suggests to the contrary) is Proportionable and Comely. He shews that he is no Judg of *Beauty*, for according to him a Flat Face without a Nose, Forehead, Cheeks, Eyebrows, or any other Protuberancies, would be handsom. So in the Face of the Earth he requires a Perfect Equality, which indeed would be a Deformity. I deny not but by Length of Time some Parts of the Earth may be worn away, or broken in, and sunk down, &c. and so may look ragged and disorder'd: but he is very effeminate and nice if he will not bear with these reverend Wrinkles, these lesser Defects

Defects of Pulchritude in our Mother Earth, which she hath contracted by her Old Age. But as to the main, she bears her Years well, and keeps her pristine Beauty. That Mixture of Risings and Plains, of Hills and Dales, &c. which we discover in her, is an Ornament, and renders her in the whole Uniform and Regular: and therefore 'tis not to be question'd but that she was not without these at first.

And particularly as for *Mountains*, which he reckons among the Monstrosities of this Earth, and as the Effect of the Desolating Flood, it is as evident as a plain Place of Scripture can make it, that the Earth before the Flood was not destitute of these; for it said, *Gen. 7. 19. The Waters prevail'd exceedingly on the Earth, and all the high Hills that were under the whole Heaven were covered.* And further yet, *ver. 20. (to make it yet plainer) fifteen Cubits upwards did the Waters prevail, and the Mountains were covered.* Therefore it is undeniable that the Antediluvian Earth had high Hills and Mountains, unless he will say that they were covered before they were. And if they were before the Flood, it is not to be question'd that they were the Product of the First Creation, and were made by God himself. It is probable this is intimated from that Epithet which is given them in *Gen. 49. 26. the everlasting Hills.*

Hills. *Gnolam* here signifies the Antiquity of them, *viz.* that they were made at first, when the Earth was created, and so are as it were *perpetual* or *everlasting*. However, if this be not meant, it is rashly said by a very * Learned Writer, that it is an *Idle Adjection*. Which appears further from *Psal.* 90. 2. *Before the Mountains were brought forth, or ever thou hadst formed the Earth and the World: even from everlasting to everlasting thou art God.* Where we see that the Production of the *Mountains*, and the forming of the *Earth* and the *World* are synchronical: which this Writer denies by saying they were produced a long time afterwards. This is a Psalm of *Moses*, which makes it the more remarkable, for he that writ of the Creation, and afterwards of the Flood, and tells us the Waters of it cover'd the highest Hills and Mountains, positively asserts here, that these Hills and Mountains were created at the same time with the Earth and the World; which confirms what he had said before. And that Passage in *Prov.* 8. 25. is very much to this purpose, *Before the Mountains were settled, before the Hills was I brought forth:* for *Solomon* is there describing the Eternity of *Wisdom*, and shewing that it existed before the Creation of the World, and accordingly enumerates the principal

* Jo. Cleric. Comment. in loc.

cipal Works of the Creation, as *the Depth, the Sea, the Fountains of Water, the Heavens, the Clouds, the Earth and its Foundations*, and among these mentions the *Mountains and Hills*, and asserts that *before these* and the other Parts of the Creation were produced, *Wisdom* had an Existence. Whence any Man of consistent Thoughts would infer, that the *Mountains* (as well as *the Sea, the Heavens, the Fountains of Water, &c.*) were part of the first Creation; for else they would not have been reckon'd up together with the rest as Parts of it. We may conclude then, that those Vast Swelling Protuberancies of the Earth were of the same Date with the World. Though, when I say this, I do not deny but there might be some Hills rais'd afterwards by the Waters of the Deluge in *Noah's* time, which as they threw down some Hills, so they made some others by casting up great Heaps of Earth. This I am not unwilling to grant as a thing Probable, but what I have said before is Certain.

As to the manner of the Production of the First Hills and Mountains, no Man can be positive. It is likely they were rais'd by Subterraneous Fires and *Flatul's*, saith * *Mr. Ray*; but I rather think that the Primitive Elevation of the Mountains was another thing.

* Of the Primitive Chaos.

thing, and that those Fires were scarcely kindled, or set on work so easily. Some have guessed they were thus caus'd, *viz.* whereas at first the Waters and Earth were both mix'd together, God soon after made a Separation between them: and in order to the parting of them there were Cavities and Channels made in the Earth to receive and convey the Water: whence the Earth which subsided and was depress'd in one Place rose up in another, and caus'd the Mountains. This is thought to be a rational Account of the Formation of these Vast Bodies: but whether it be exact or no, no Man can certainly tell. But this we are sure of, that they existed at the first forming of all things, and were constituent Parts of the Primitive Earth, which this Writer's *Theory* utterly denies, and saith it was all Champain, plain and level. So that whilest he avoids *speaking like an Oration* concerning the Earth, (which he is set against, he saith) he cannot afford to *Speak Truth, i. e.* to acknowledg what the Holy Scripture it self attests in plain and intelligent Terms concerning the Original of Mountains, *viz.* that they were a part of the first Creation of the World.

And being so, they are questionless of *Use*, for the Great Creator made nothing in vain. Because we cannot possibly see how Great the whole Body of the Earth is, therefore there
are

are some Parts of it purposely lifted up above the rest, to give us some Intimation and Knowledg of this Huge Globe whereon we stand. That Body which is 7000 Miles in Diameter, and above 20000 in Circumference, is as it were abbreviated by this means into lesser ones, some of three or four, some of ten or twelve, others of twenty or near thirty Miles in Height. By beholding these Eminent and Exalted Parts we may guess at the Gigantick Proportions of the Whole Extended Mass it self, and admire the Divine Providence which supports its Weight and Bulk. Thus because the Earth it self was hid from us (excepting what is to be seen within the Compass of our scant Horizon) by reason of its Convex Figure, and the Shortness of our Sight, it was fitting that some Remembrances and Representations, as 'twere some Maps of the whole, should be before our Eyes: and these are the High Hills and Mountainous Eminencies which we see, as *Caucasus*, *Olympus*, *Atlas*, *Athos*, *Ætna*, *Hecla*, *Teneriff*, which are as 'twere Epitomes of the Whole Earth.

Again, these were design'd to be Boundaries and Limits of certain Regions and Countries. Thus *Taurus*, the biggest Mountain in the World, divides all *Asia* into two Parts, the one Northward, the other Southward. The *Pyrenean* Hills separate the Kingdoms of
France

France and Spain: the *Alpes* part *Italy* from *France*. And several other Mountains are the Natural Barriers which God hath set between Countries and Nations, though daring and ambitious Minds take no notice of it, and impatiently long to have such a *Miraculous* Power as to be able to remove these Mountains, to take away these Great Land-Marks and Distinguishing Limits.

Moreover, these Parts of the Earth, which as to outward View are generally fruitless and barren, and therefore may seem useless and unprofitable, contain great Riches in them. Some of the Rabbins derive *Har* (the Hebrew Word for a *Mountain*) from *Harah*, *gravidam esse*; and they give this Reason, because they are big with Metals, and swell'd with the precious Treasures that are lodg'd in their Womb. These Places are the proper Receptacle of Minerals and all sorts of Fossiles that are useful to Mankind. These Bulky Substances do not take up room to no purpose: these Big-bellied Bodies are pregnant with things of the greatest Value and Worth: within them are laid up the Wealth of the World. But of this I shall say more when I come to speak of the *Subterraneous World*.

Again, these Places are fittest for the nourishing and producing of Vegetables. There is no where else (as hath been observed by *Botanists*) such Variety of Plants and Herbs.

Further, these Elevations of the Earth are necessary for conveying Water to us, for from hence by Channels under Ground are derived the Springs of this Element. They serve as Alembicks to distil fresh Water for the Use of Man and Beasts: and their Heights are serviceable to the more facile Descent of the Streams. Nay, these Streams could not flow unless the Heads of them were thus mounted above the ordinary Level of the Earth. There was an absolute Necessity therefore of these Hills, that there might be a Descent of these Waters. If the Earth were every where level and plain, there could be no running Streams or Rivers. More especially, in very Hot Countries these elevated Parts of the Earth are necessary to supply these Springs, for on the Sides of them those abundant Vapours that are exhaled out of the Earth are condensed, and turn'd into Water, as is proved by a very * Ingenious Gentleman. And † another famous Virtuoso, who hath written since, hath exceedingly confirm'd this Truth, having with great Perspicuity shew'd that *Mountains* are the Heads and Sources of Springs and Rivers, and that there would have been no Running Streams on the Face of the Earth if there had not been these Exaltations

* *Mr. Halley, Philos. Transact.* † *Dr. Woodward's Hist. of the Earth, Part 3.*

altations of the Ground, for here the Waters are condensed and discharged. Accordingly he observes that those Countries that are in the Torrid Zone, or near or under the Line, where the Heat is greatest, and consequently where there is the greatest need of Water, are furnish'd with Mountains answerable, *i. e.* such as for Bigness and Number surpass those of colder Countries. This he therefore concludes to be the Providential Contrivance of Heaven, and to be an Argument of the Divine Conduct and Wisdom.

As for the Highest Mountains in the Southern Parts of the World, an * Ingenious Naturalist tells us, that there is very great Use of them for repelling the Vapours exhaled by the Sun's powerful Beams in those hot Regions, and for hindring their Evagations Northward : which he thinks is of great Advantage.

It might be added, that the High Hills render the Earth more convenient and useful for Habitation ; for if it were all even and level, the Houses would lie open to the Winds and to the Sun, whereas by this Mixture there is a Shelter from both.

Furthermore, this Inequality of the Earth is futed to the Difference of those *Animals* that live upon it, to some of whom the high-

* Mr. Ray, of the Primitive Chaos.

er and mountainous Places which are hot and dry are most agreeable, yea it is observ'd that they cannot live any where else; and to others those Regions that are depressed and are more cool, moist and shady, are most wholesom and delightful. And lastly, a * Worthy Writer is designing to prove that even the *Vulcano's* or *Burning Mountains* (as *Ætna*, *Hecla*, *Vesuvius*, &c. which seem to be very noxious) are of Use to the Places where they are, and to the Earth it self, and to Mankind, insomuch that they could not subsist without these, or without the Agents whereby these fiery Eruptions are effected. Thus from what hath been said it is abundantly evident that the *Mountains* are a very considerable Part of the Creation, and are signal Testimonies of God's Bounty as well as of his Power in his forming of the World.

* *Dr. Woodward*, Part 5.

C H A P. VI.

Vegetables are next consider'd, and their Different Parts enumerated, and shew'd to be Arguments of a Divine Contriver. Their Fragrancy, Delightfulness, Beauty. Their Various Natures, Kinds, Properties. Their Usefulness in respect of Food. Particular Instances of some Foreign Plants, viz. the Metla, the Cocus-tree. They are serviceable for Physick. The Signature of some of them declares their Properties, and is a Divine Impression.

TO the Earth properly belong *Vegetables*, i. e. Trees, Plants, Herbs, Flowers, and all Fruits that are the natural Product of them; which, whether you consider their Excellent *Make*, or their Great *Variety*, or their known *Usefulness*, bear witness that they are the Offspring of a Wise Parent. First, let us contemplate the Curious and Exact Composure of these Vegetative Creatures. They consist of, 1. A *Root*, by which they suck Moisture, Sap and Nourishment from the Earth, and from which also these are convey'd into all the Parts of the Tree or Plant. 2. A *Trunk* or Body: Or in Herbs 'tis call'd the *Stalk*, which is remarkable for

I 3 its

its distinct *Knots* and *Joints*, which are at convenient Distances, and were design'd to uphold and sustain the Plant, for these Joints strengthen the Stalk. 3. A *Bark*, which is for the Preservation of the Trunk. And this is lined with an inward *Skin*, *Peel* or *Rind*. The Barks of some Trees especially are very remarkable, and particularly that of the *Cinnamon* Tree is worth more than the whole Body. 4. *Pith*, (*Medulla*, *Cor*) by this the Aliment is carried from the Root to the other Parts. It answers to the *Spinal Marrow* in Animals. 5. *Branches*, the extreme Parts or Limbs, and they answer to Arms and Legs in sensitive Creatures. The lesser ones are *Surculi*, *Twigs*. 6. *Fibres* or *Filaments*, little hollow Strings for carrying the alimental Juice, or something of that nature to all Places. 7. *Flowers*, with their initial and progressive *Buds*, *Blooms*, *Blossoms*. 8. *Fruit*, in order to which all the other Parts are. 9. *Seed*, which is for the Propagation of the Species, and is admirable for its Make; for a Microscope will inform us, that it contains the Whole Plant in it. All the different Parts before-mention'd are to be found here shut up in a Shell or Husk; So that every *Seed* is a *Plant* epitomized. Lastly *Leaves*, which may perhaps seem to be a very inconsiderable Part of Vegetables, and might well be spared: but if we make Enquiry into them, we shall find

find that they are for several uses. In respect of the Flowers and Fruit-trees to which they belong, they are a Shelter and Guard to defend them from the Inconveniencies and Injuries of the Weather, *viz.* the Insults of sharp and boisterous Winds, the excessive fall of Rain or Hail, and the immoderate heat of the Sun. *Leaves* are likewise an Ornament as well as a Fence: and their great variety of work is worth the Observation of the Curious, for some are open and spread out, others are folded together, some are even and smooth, others are wrinkled or crumpled, or rough. Others are either shining, or winged, or perforated, or threaded, or spotted, or full of veins, or hairy, or prickly, or flowry. Some are round, some are triangular, some are oval: others are sharp-pointed, or forked, or cut and divided into several Partitions, some of them into 8 or 9. And as to the Edges, some are plain, others are uneven; and these latter are either indented, or waved, or engrailed, &c. or they look as if they were rent and torn. Further, if we may give credit to *Malpighius*, a very good Author in this matter (who is seconded by Mr. *Ray* who is another very good Judge in the case) *Leaves* are for the concoction of the Aliment derived to the Trees. In respect of *others* they have their use also, for they afford a cool shade in Summer: which in hot Climates especially is unspeakably welcome, be-

cause comfortable and refreshing, pleasant and delightful. I could add that in some places where there is abundance of Trees, the Leaves when they fall and are dry do for a little time serve poor Folks for Firing; and I remember I have seen them rake them together for that purpose. Or, if they be let alone upon the Ground, they are a sort of Compost, and do in some small measure improve the Soil.

Now, can any Thinking Head entertain such a Thought as this, that all these several parts, which have all a plain relation to one another, and have also a general reference to the good of Mankind, for which we see they are useful, and wherein we may evidently see there is so much Design and Contrivance, were produced by mere Chance, or (which is the same) by a blind Operation of Unintelligent Matter? No certainly, this cannot enter into the Mind of a Man that thinks and considers; especially if he takes notice of what the excellent *Malpighius* and others have demonstrated, *viz.* that there is not any part or function in *Animals* but 'tis answer'd by something of the like nature in *Plants*. There are in this Rank of Creatures distinct Organs and Vessels for the managing of *Concoction*, *Nutrition*, *Procreation*, &c. though they are in a different shape and guise from what they are in Beasts and Birds, and such like perfecter Animals. This was not unknown to the
Antient

Antient Stagarite, according to whom a *Plant* or *Tree* is a *Man invers'd*: the Root is the Head and Mouth, the Trunk is the Body, the Bark is the Skin, the Pith is the Heart, the Fibres are in lieu of Veins, Arteries and Nerves; the Boughs and Branches are the Arms and Feet, and the Leaves are the Hair. But this Old Notion hath been lately improved and more than ever illustrated by that Learned *Italian*, who hath so highly merited of Medicks and Natural Philosophy.

To proceed, what excellent Things doth the Vegetable Kingdom afford us! Who is not ravish'd with the excellent *Shape*, *Colour* and *Smell* of the Plants and Flowers which a choice Garden is stock'd with? Hence perhaps some of the *Grecians* philosophized in the *Walks* and *Gardens* about their Cities, and made their serious Studies pleasurable by this means: Besides that here was administred occasion enough for Philosophy. Here a Man is as 'twere transplanted into *Paradise* again, and is environ'd with Innocent and Harmless Delights. So that 'tis no wonder that One forsook his Crown, and turn'd Gardiner. He prefer'd Botanicks before Politicks; or he reckon'd a Florist's Employment to be Royal and Princely, he counted a Garden a Kingdom, unriddling that of the Poet,

— *Inscripti*

—————*Inscripti nomina Regum*
Nascuntur flores.—————

Indeed there are some of these that seem to be formed for Sight and Beauty only, or chiefly, as *Tulips, Anemonies, &c.* of which there is scarce any other use to be made. And that use is sufficient, for hereby they shew the more Transcendent Beauty of their Maker. And as for the rest whose Virtue and Efficacy we are well acquainted with, even they are endowed with their pleasant and delightful Colours on purpose to entertain the Eyes of Men, and thereby to affect their Hearts with the Sense of their Munificent Master, whose Livery they wear. Of these our Saviour speaks in *Mat. 6. 27.* telling us that *they spin not,* and yet they are very richly clothed, even with more than Royal Apparel, for *Solomon in all his Glory was not arrayed like one of these,* ver. 28. Hence it was that a Pious Man (whose Name is well known) being invited by an Honourable Person to go and see a stately Building, (the Master-piece of English Architecture in those Days, saith my Author) desired to be excused, and to sit still gazing on a *Flower* which he had in his Hand: For in this Flower, saith he, I can see more of God than in all the Beautiful Buildings in the World. Yea, here is not only most exquisite Beauty to delight the Eye, but here is a most
 fragrant

fragrant Smell to please the Nostrils and cheer the Brain. Both which Gifts and Properties seem to be peculiarly bestowed upon *Flowers* as a Recompence of their frail Nature, and sudden withering which they are incident to above all the other Works of the Creation. Their excessive Sweetness and their glorious variety of Colours make amends as it were for their Short Life.

• Their great *Number* and *Variety* are also worthy of our Consideration. There are some Plants that are of a lower and imperfect Rank, as those which grow in the Sea, *viz.* *Corals*, (some of which are Red, some Black, others White) *Spunges*, *Alga's*, &c. and some on the Land, as *Mushrooms*, *Mosses*, and several *Vegetable Excrescencies*. But the more perfect Ones, such as have Seed and Flower, as they are the most Numerous, so they are of the greatest Virtue and Use. These you will find rank'd in their several Divisions, and distinctly and accurately set down by Mr. *Ray* in his *History of Plants*. And yet so vast is the number of these Vegetable Bodies in the World that there are many more than you meet with in the Exactest Botanist. For there are Plants peculiar to particular Countries and Regions, as is confessed; and therefore in *America* and other parts of the World which are yet undiscovered, there is doubtless a considerable number of *Simples* which we have no knowledg of. The

The difference of Plants is very great in respect of the Soil and Air which so much differ, and from whence they derive their Nature. And tho I cannot subscribe to the Rabbins, who (as we are * told) very confidently assert that there is not an Herb which grows on the Earth that hath not its peculiar Star to influence it, yet I doubt not but their Difference is much caused by the peculiarity of that Influx and Virtue which they partake of from the Heavenly Bodies, *i. e.* from their various Aspects and Operations.

They are commonly by the Masters of Medicks distinguish'd according to their *degrees of Heat*; some having a moderate Warmth, corresponding to the natural Heat of our Bodies: others exceed the native temperate Heat of a Man, and accordingly as this Excess prevails in them they are said to be hot in the 2^d, 3^d or 4th Degree. Some are Strong and Robust, others are very Weak and Feeble, as *Vines, Hops, &c.* But this is to be remarked that such infirm Plants are provided with *Tendrels* to lay hold on or twine themselves about other Trees, or Poles, or any thing near them to sustain them.

Some make a *Distinction of Sexes* among Plants, as the *Palm-tree, Lavendar, Speedwell* or *Veronica, Piony, Fern, Southern-Wood, &c.* but

* Mr. Selden de Dîs Syr.

but especially the *Palm-tree*, which *Galen*, as well as *Pliny* and others, takes notice of. And they being Male and Female, thence follow Love and Wedlock; and accordingly *Pliny* tells us that if the Female *Palm* be far removed from the Male, it becomes barren, and bears no Fruit: and such is the Conjugal Affection between them that if the Male hath the Boughs broken, the Female droops and withers. But though this be the Dream of some Amorous Botanists, yet the most sober Naturalists acknowledg, upon good Philosophical Accounts, that there is a Correspondence between certain Plants of the same Species, and by their Proximity or Distance this is sometimes discern'd. And so among Vegetables of a different Species there is (as some Philosophers and Physicians have observ'd) a *Sympathy* and *Antipathy*: by which if they mean that some Plants agree and grow well together, as the *Lilly* and *Rose*, *Vine* and *Olive*, *Rose* and *Garlick*, *Vine* and *Elm*; and that others disagree in their Natures, and will not grow and thrive by one another, as the *Vine* and *Coleworts* (the former shuns the latter, and twines about every thing else but that: whence perhaps the old Notion, viz. that *Coleworts* are an Enemy to *Drunkennes*, and are good to prevent it, first had its Rise), *Hemlock* and *Rue*, *Rose* and *Onion*, the *Vine* and *Laurel*. If this, I say, be all that they mean

mean, that some Vegetables prosper and others do not according to their Position and Situation to other Plants, I do not see but that it is a Rational Assertion, and if the grounds of it were well examined and look'd into, they might yield matter for a devout and serious admiring of the Works of God. There is such a thing as an Agreement and Consent between the Natures of Beings: There may be observ'd a mutual League and Confederacy among them. And other things are at Variance and Discord, and there seems to be an open Hatred and Enmity between them. Some have observed this in Animals, as the Toad and Spider, the Stork and Bat, the Elephant and Hog, the Lion and Cock, &c. which maintain a mutual Aversion to one another, from certain natural Principles, as some Learned Enquirers have thought, tho this is rejected by others. It is further remarkable that Plants of a contrary Nature and most different Quality receive Nourishment from the same spot of Earth: Or (which is equally admirable) in that one spot of Earth there are contrary Nourishments, which those Plants draw to them according to their several Natures. This is a noble Contemplation, and is worthy of our most accurate Disquisitions.

As to the *Difference* and *Variety* of the Nature of the greater Vegetables, and of their Use

Use also (which I am now coming to speak of) they are thus in part represented by our *English Homer*, as he is deservedly stiled,

* The sailing *Pine*, the *Cedar* proud and tall,
The Vine-prop *Elm*, the *Poplar* never dry :
The Builder *Oak*, sole King of Forests all,
The *Aspine* good for Staves, the *Cyprus*
Funeral :

The *Lawrel*, meed of Mighty Conquerors
And Poets sage, the *Fir* that weepeth still,
The *Willow* worn of forlorn Paramours,
The *Eugh* obedient to the Benders will :
The *Birch* for Shafts, the *Sallow* for the Mill,
The Warlike *Beech*, the *Asb* for nothing ill,
The fruitful *Olive*, and the *Plantane* round,
The Carver *Holme*, &c.

It is endless to go through the whole Vegetable Dominion, and assign the Properties of every part of it. This is certain that Vegetables are fundry ways beneficial to Mankind. *Flax*, *Cotton*, *Hemp*, with several others (of which I may have occasion to mention some afterwards) bear *Clothing*. And who knows not the *Usefulness* of Plants as they are serviceable to *Food* and *Physick*? Tho there are some Trees (and those the best in some respect) as the *Oak*, *Fir*, *Elm*, &c. which

* *Spencer's Fairy Queen.*

which yield no Fruit, or such as is very inconsiderable, the firmness and usefulness of their Timber making amends in that kind, yet the greatest number of Trees bear Fruit, and yield some sort of Food. The Earth is yearly a Teeming Mother, from whose pregnant Womb all sorts of *Fruits* are produced for the nourishing and sustaining that numerous Company and Variety of Creatures that live upon it: And this wonderful Pregnancy and Fruitfulness argue a God. Whence we find this to be the religious Language of the Psalmist, * *He causeth the Grass to grow for the Cattle, and Herb for the Service of Man: that he may bring forth Food out of the Earth.* He giveth thence *Wine that maketh glad the Heart of Man, and Bread which strengthneth Man's Heart.* Which was gratefully taken notice of long before by that pious Observer of the Works of Nature, † *As for the Earth,* saith he, *out of it cometh Bread,* the support and staff of Man's Life. This is one of the most visible and sensible Arguments of a Deity that the World and particularly the Earth affords us. We *taste* as well as *see* that there is a God, and that he is Good. Though there was a *Fruit* at first which was forbid to be eaten, (by not attending to which our First Parents lost *Paradise*) yet now all are freely indulged to

to us, and there is no transgressing but by Intemperance and Unthankfulness. The cooler Fruits of the Summer (of which there is great Variety) as they are for Pleasure, so they are given on purpose by Providence to temper and allay the heat of our Bodies, and to cool and refresh the Stomach in that Season of the Year. The warmer Fruits, Roots and Herbs are in the Winter, when they are most serviceable to the Body. And even the former Ones when they are laid up, and more digested and ripen'd by time, are useful then likewise.

The *American* or *Indian* Plants far excel the *European* Ones, as we learn from those who have given us an account of the *Coca*, the *Hovia*, the *Indian Fig-tree*, the *Tuna*, the *Cacoonut*, the *Cocus-tree*, the *Metla*. The last of these is thus admirably described by the Immortal *Cowley*:

* The Man that hath the *Metla* may supply
Himself with almost all things he can want
From *Metla's* almost all-sufficient Plant.
Her very Tree is Fruit: her Leaves when
young
Are wholesom Food, for Garments serve
when strong.

K

Nor

* *Plantar. lib. 5.*

130 *God's Being, &c. prov'd*

Nor only so, but to make up the Cloth
They furnish you with Thread and Needle
both.

(A Thorn grows at the end of every Leaf, which together with the Stringy part joining to it is used as a Needle and Thread to sew withal.)

What though her Native Soil with Drought
is curs'd,

Cut but her Bark, and you may slake your
Thirst.

A sudden Spring will in the Wound appear,
Which through streight Passes strain'd comes
forth more clear.

For Liquorish Palats Honey thou dost bear,
For those whose Gust wants quickning, Vi-
negar.

But these are Trifles, thou dost Wine impart,
That drives dull Care and Trouble from the
Heart.

To all these Gifts of Luxury and Wealth
Thou giv'st us Sovereign Medicines too for
Health.

Choice Balm from thy concocted Bark breaks
forth.

No Antidote affords more present aid
'Gainst doubly mortal Wounds by pois'nous
Arrows made.

Of all the Exotick Plants or Trees that we
read of, the *Cocus-tree* or *Indian Palm-tree*,
(as

(as some call it) is the most Admirable and Remarkable: For besides that it bears clusters of *Coco-nuts* every Month, it affordeth Water, Vinegar, Oil, Sugar: Yea, it supplies the Inhabitants with Bread, Wine, Clothing; for the Pith of this Tree serves for the first, the Juice of it for the second, and the Down of its Leaves for the third. This Tree alone is said to be sufficient to build, rig, and freight a Ship. This alone is both Vessel and Cargo. Some describe it thus, the Body and Branches of it yield Timber for Houses and Ships: the large Kernel is Meat: the Shell is big enough to make Drinking Cups: the Rind affords Materials for Cables, Sails, Ropes, &c. The Milky Liquor in the Nut makes good Drink: and an admirable sweet Oil is pressed from the Kernel of it. Mr. *Herbert* hath thus deciphered it,

* *Sometimes thou dost divide thy Gifts to Man,
Sometimes unite. The Indian Nut alone
Is Clothing, Meat and Trencher, Drink and Kan,
Boat, Cable, Sail and Needle all in one.*

Or take it more largely in the Words of Mr. *Cowley's* Muse,

*What senseless Miser by the Gods abhorr'd
Would covet more than Cocus doth afford?*

K 2

House

* In the Poem entituled *Providence*.

*House, Garments, Beds and Boards, even
 while we dine,
 Supplies both Meats and Dish, both Cup and
 Wine,
 Oil, Honey, Milk the Stomach to delight,
 And poynant Sauce to whet the Appetite.
 Nor is her Service to the Land confin'd,
 For Ships entire compos'd of her we find.
 Sails, Tackle, Timber, Cables, Ribs and Mast
 There with the Vessel fitted up, at last
 With her own Ware is freighted; all she bears
 Is Cocus growth, except her Mariners;
 Nor need we ev'n her Mariners exclude
 Who from the Coco-nut have all their Food.*

Among the Foreign Plants we may reckon
Tobacco and *Coffee*: the former is the Product
 of the Plantations in the *West-Indies*, the lat-
 ter grows on little Trees or Shrubs in the De-
 serts of *Arabia*, and scarcely any where else:
 And both are of great use at this Day in the
European parts, whether more for Diversion
 than real Benefit I will not now dispute.

As to *Physick*, the use of Plants is notorious,
 as we may learn from every *Herbalist*, and the
Common Dispensatory. The Roots, Barks,
 Fruits, Seeds, Flowers, Tears, Juices, Ro-
 sins, Balsams are particularly serviceable to
 Medical Purposes. It hath been observ'd and
 approved of by the most Inquisitive Natura-
 lists, that Plants are appropriated to particular
 parts

parts of the Body ; and though they may be serviceable for curing Diseases of other parts, yet they are chiefly and more signally destined for the redress of such and such individual Ones : Thus *Piony*, *Betony*, *Rosemary*, *Marjoram*, &c. are appropriated to the Head and Brain : *Eye bright*, *Clary*, *Celandine*, *Rue*, &c. to the Eyes : *Parsley*, *Marshmallows*, *Saxifrage*, *Drop-wort*, &c. to the Reins and Bladder : *Angelica*, *Saffron*, *Balm*, *Buglosse*, &c. to the Heart : *Cardamom*, *Pepper*, *Ginger*, *Nutmeg*, &c. to the Stomach : *Sebesten*, *Jujube*, *Lung-wort*, *Horehound*, *Coltsfoot*, &c. to the Breast and Lungs. There are other Simples that are good against the Distempers of the Womb, as *Arach*, *Mother-wort*, *Birth-wort*, &c. Herbs available for Ruptures are *Solomon's-Seal*, *Rupture-wort*, &c. Wound-Herbs are *St. John's-wort*, *Sanicle*, *Tutsan*, *Self-heal*, *Saracens Confound*, &c.

And here I might mention what is asserted by several Antient Natural Philosophers, viz. That the outward *Signature* or Impression which is on some Plants shews their inward Virtue ; and that from the Resemblance which they have to the parts of a Man's Body we may gather their secret Power, and know to what particular part they are appropriated. Thus the *Squill* and *Poppy* are good against the Head-ach, they themselves resembling a Head.

134 God's Being, &c. prov'd

The * *Walnut* hath upon its Fruit the Signature of the Head and Brain, and accordingly it is beneficial to them. Which is taken notice of, and thus represented by the Excellent *Cowley*, in his Fifth Book of Plants,

*Nor can this Head-like Nut, shap'd like the
Brain*

*Within, be said that Form by chance to gain,
Or Caryon call'd by Learned Greeks in vain.
For Membranes soft as Silk her Kernel bind,
Whereof the inmost is of tenderest kind;
Like † those which on the Brain of Man we
find:*

*All which are in a Seam-join'd Shell enclos'd,
Which of this Brain the Scull may be suppos'd.
This very Scull envelop'd is again
In a Green Coat, his Pericranion,
Lastly, that no Objection may remain,
To thwart her near Alliance to the Brain,
She nourishes the Hair, remembering how
Her self deform'd without her Leaves doth
show,*

*On barren Scalps she makes fresh Honours
grow.*

This *Natural Stamp* is observable on other Vegetables: Thus the Leaves of *Balm* resemble a Heart: which Signature shews it

* *Κεφαλον*, from *κεφαλ* caput. † *Pia & Dura mater*.

to be Cordial, and a great Refresher of that part. *Eye-bright* hath the plain impress of the Eye, and 'tis with Success made use of against the Maladies of that part. *Kidney-Beans*, call'd so because they represent the Kidnies, particularly affect those Vessels. The Multiplicity of Joints and Knots in the Root of the Herb call'd *Solomon's Seal* (which is denoted by its Greek Name *πολυγώναιον*) shews that it is available against Ruptures, and that it joins and knits green Wounds; it doth close and seal them up as 'twere, whence perhaps it hath its Denomination. And *Liver-wort* and other Simples might be mentioned, which are Medical for that part whose Signature and Resemblance they bear. Some think this to be fanciful, but upon due consideration it will be found to be very serious and solid: For these Marks and Impressions are real things, and go along with the whole Species, and are never alter'd. Two very Eminent Persons (to mention no more at present) who were not guilty of indulging their Fancy and Imagination, and who were great Enemies to Vulgar Errors and Prepossessions, freely own the significancy of these External Resemblances on the Bodies of the Plants. The one is the Learned * *Hugh Grotius*, who among his Arguments for a God and Providence assigns this

K 4

as

* De Verit. Christ. Relig.

as one. The other is the Famous Dr. *Willis*, who hath (I remember) these Words in his *Pharmaceut.* *Some things are found good against the Jaundice by a similitude of Substance, and as it were by a Signature, viz. as being endowed with a yellow Juice, as Rhubarb, Yellow Sanders, Saffron, &c.* These visible Characteristics of Plants were impressed upon them by the singular Favour and Goodness of Heaven, to let us understand by the bare looking upon them what they are useful for, to let us read in the Colour, Figure and Proportion of them what their intrinsick Nature is. In short, there is not the least Plant, though never so contemptible and trodden under our Feet, but was made for some use and purpose, as our late Improvements in this Study partly have discover'd, and as succeeding Ages (if they be not over-run with Sloth and Ignorance) will further manifest to the World, and therein display the abundant Goodness and Benevolence of God to it.

C H A P. VII.

God is to be found in the Subterraneous World. Where are Waters, Fires, Metals, Minerals, to which latter belong Earths, Salts, Sulphurs, Stones both common and Precious. The Loadstone particularly considered, and the Author's Opinion concerning it. He disapproves of the Total Dissolution of the Earth at the Deluge, and gives his Reason for it. His Judgment touching Earth-quakes and Trepidations of the Earth. He invites the Reader to reflect with great seriousness upon the late Instance of this kind: and to that purpose offers some Remarks upon it. Which he closes with a Devout Address to Heaven, to supplicate the averting of the manifestation of the Divine Displeasure in this kind for the future.

IF we descend into the *Subterraneous World* (as *Kircher* styles it) * the deep places of the *Earth*, as they are called by the *Psalmist*, these also will supply us with Arguments to the same excellent purpose. Here we shall be transported with the Contemplation of the strange

* מַחְרְקוֹ אֶרֶץ *Psalm. 95. 4. infima fundamenta vel penetralia terræ, quæ sciri nequeunt nisi exquisitâ perscrutatione. Buxtorf.*

strange Make and Composure of those various Caverns that are hid from common Eyes, those Unseen Rarities of the Under-ground World: for what is unseen of this Earth is most astonishing. Here is a vast Receptacle of *Waters*, called by *Moses the Fountains of the great Deep*, Gen. 7. 11. This great Collection or *Abyss* of them is placed in the *Central* parts of the Earth, as Dr. *Woodward* hath probably asserted. Here are Millions of Aqueducts to convey Water from the Sea. Here are Springs and Fountains that supply the Land with Brooks and Rivers. Here are Medical Waters and Baths for the relief of the Diseased. Here are also the vast Treasures of *Fire*, that is, that Combustible Matter wherein those subtile Particles are shut up that engender Fire; and likewise here are Magazines of Actual Fire, as appears from those *Volcano's*, those fiery Eruptions which are taken notice of in several Places. And that there is Fire in the Earth may be proved from this, that * the Bottoms of the deeper Mines are very sultry, and the Stone and Ores there are very sensibly hot, even in Winter. Here are lodged *Metals* (the 7 *Terrestrial Planets*, as the Chymists are pleas'd to call them) *Gold* (the Sovereign and Chief of all, because of its transcendent Purity, Brightness, Solidity and Weight)

* Dr. Woodward, Nat. Hist. of the Earth, Par. 3.

Weight) *Silver, Steel* (which is but the harder Part of *Iron*) *Copper, Quicksilver, Tin, Lead*. As for *Brass* (*Orichalcum, æs*) it is a mixt Metal, *viz.* of *Copper* and *Lapis Calaminaris*: *Pewter* is a Compound of *Tin* and *Lead*. The Property of *Metals* whereby they are distinguish'd from other Terrestrial Bodies is, that they may be *melting*, and are *malleable*. Especially Pure Gold is ductile above all other Metals, for an Ounce of it may be so extended by Malleation, that it will take up ten Acres, if Dr. *Charleton* may be credited. As for the use of Metals, none is wholly ignorant of it: they were made for Defence and War, for Instruments to work with, for Medicine, for Ornament, for Vessels to be used in eating and drinking, and all other Services whatsoever, for Money and Coin; and in a word, they are some way or other useful to all the necessary Ends of a Man's Life, and consequently are Testimonies of God's Care and Concern for the Good of Mankind. Accordingly you will find that these *Metals* are particularly taken notice of and mentioned by *Job* to prove the infinite Power and Wisdom of God. Surely there is a Vein for the Silver, and a Place for Gold where they find it. Iron is taken out of the Earth, and Brass is molten out of the Stone. Job 28. 1, 2.

Here are the Repositories not only of *Metals* but *Minerals*, (for though by a general Name

Name all *Metals* are called *Minerals*, because they are dug out of the *Mines*, yet in Propriety of Speech these are distinguish'd from them, because whereas *Metals* are properly those Bodies that are capable of being melted by the Fire, and of being beaten or drawn out by the Hammer, *Minerals* have only one of these Properties) as *Antimony*, *Litharg*, *Verdigrise*, *Minium* or *Red-lead*, *Cerusse* or *White-lead*, *Black-lead*, &c. And several other *Fossiles* there are (which if I seem not to range in their due Order, I may be excused, for I have consulted at one time or other several Writers on this Subject, but they all differ from one another, they do not refer these Minerals to the same Heads) as 1. Those that are usually call'd *Earths*, as *Terra Sigillata*, *Lemnian*, *Armenian*, *Samian Earths*, and several others that are used in Medicks. 2. *Salts*, as Common Salt (natural, not factitious) *Salt Gem*, *Salt Armoniack*, *Nitre* or *Salt Petre*, *Allom*, *Vitriol* or *Copercas*, &c. 3. *Sulphurs*, as *Ambergrise* (a bituminous Matter found sometimes on the Sea-shore) *Arsenick*, *Orpiment*, or *Yellow Arsenick*, *Napht*, *Bitumen* or *Asphalt*, *Amber*, *Jet* or *Black-amber*, *Stone-coal* or *Pit-coal*: Concerning the last of which it might be observed with relation to our selves here in *England*, that the Counties of the sharpest and piercingest Air, and most troubled with cold Winds, Snow and Frost

(as

(as *Northumberland, Cumberland, &c.*) have the greatest Plenty of Coals and at easy Rates: which by the way is no contemptible Instance of Divine Providence. Of these Sulphureous Materials it is likely *Job's* words are to be understood, *ch. 28. v. 5.* where speaking of the Earth, he saith, *Under it is turned up as it were Fire*, i. e. although the Superficies of it shews nothing of this kind, but perhaps yields Corn and other Fruits, yet *under* it are such *Fossiles*, as *Brimstone* and other Combustible Matter, which contain Fire in them, and so it is properly said [*as it were Fire.*] 4. *Stones* which are either *Common* or *Rare*. Of the former Sort there are dug out of the Earth *Marble* (of which there are several kinds, black, white, greenish, yellow, red, the chief of which last is *Porphyrie*) *Alablastre*, a kind of softer Marble, *Free-stone*, *Flint-stone*, *Slate* or *Tile-stone*, *Whet-stone*, *Lapis Lydius* or *Touch-stone*, *Lime-stone*, *Plaster-stone* (of which *Plaster of Paris* is made) *Asbestine* or *Incombustible Stone*, *Talk*, *Pebles*: and several Stones used by Physicians, as *Lapis Lazuli* or the *Azure-stone*, *Blood-stone*, *Jew-stone*, *Ætites*, *Nephritick-stone*, &c.

Those Stones which are *Rare* and *Precious*, are not (as the *Vulgar Ones*) made of the Collection of small Sands, but they are liquid Consistencies or Drops condens'd in the Earth: they are such as these, the *Diamond* or
Adamant

Adamant, and the *Chrystal*: the former of which as it is the most Sparkling, so 'tis the Hardest of all Stones; wherefore by reason of its irresistible Hardness it is used in cutting and working of other precious Sones. Both this and the *Chrystal* are Transparent, and void of all Colour. The Coloured Ones are the *Carbuncle*, red as Fire: *Ruby*, sparkling more than a Carbuncle, and not so fiery: *Beryl*, a Sea-green: *Opal*, of all Colours very delightful and beautiful: *Turcois*, blew, white and green blended: *Topaz*, golden Colour, yet greenish: *Emerald*, green: *Chrysolite*, a lighter green: *Sapphire*, blew or skie-colour'd: *Hyacinth* or *Jacinth*, reddish, or red mixt with yellow: *Jasper*, of several Colours, green, purple, yellow, and the Veins are of different Colours: *Agate* of diverse Colours mixt: *Onix*, called so because 'tis of the Colour of a Man's Nail: *Sardonix*, compounded of an *Onyx* and *Sardius*: *Chalcedony*, of a cloudy duskish Colour: *Amethyst*, of a violet Colour, *i. e.* compounded of red and blew: *Cornelian* or *Sardius*, a languid Blood-Colour. All these Rich Gemms which are remarkable either for their *Transparency*, or their *Colours*, or their *Virtues*, (as Expert Jewellers and Lapidaries know very well) are lodged by a Divine Hand in the Caverns of the Earth as in a safe Casket, and thence they are taken out to enrich and embellish Mankind,

Mankind, and are illustrious Tokens of the Heavenly Bounty and Munificence, and therefore even the Inspired Writings frequently make mention of them.

To the *Mineral* Kingdom belongs the *Load-stone*, which hath a most amazing Virtue to draw Iron and Steel to it : and as the Masters of Experiments tell us, being capp'd with Steel, its Attractive Power is the more forcible. But it hath puzzled all Mankind to assign a Reason of it : for what hath been hitherto said by Philosophick Men seems to be altogether unsatisfactory. Who can give Credit to that Romantick Solution of the *French* Philosopher? The Attraction of the Load-stone, saith he, is caused by the Communication of the striate Particles which issue forth of the Poles of the Heavenly Vortex, and find a fitter and better Passage through the Pores of the Magnet and Iron than any other Bodies, and drive the Air before them, and cause those two to meet together, and as 'twere to salute one another. But, besides that this is not *Attraction* but *Pulsion*, it is a mere Figment of that incomparably Ingenious *Monsieur*, who knew not how to solve this unaccountable Phenomenon, but by such Philosophick Jargon as this. And as for the Load-stone's causing the Needle, which is touched with it, to turn toward the North, there is this lame account given of it. The *Earth* is a Great Magnet,
and

and where there is most *Earth* (*i. e.* least mixed with *Sea*) as in the North Part of the World, the Load-stone looks that way, and with it the Needle of the Compass. Others, to make it out plainer, fancy a vast Company of Quarries of Load-stone in the Northern Part of the World, whereby this Attraction is made, and whereby the Magnetick Needle tends towards the North as its beloved Point. But this is fanciful rather than solid, and no Man alive can make any certain Proof of there being more *Load-stones* in the *Northern* Part of the World than there are in the South, or either of the other two Quarters of the Earth. Therefore I must needs declare that though I have an Ear always open to any ingenious and probable Resolution of a Philosophick Difficulty, yet I look upon the Accounts that have hitherto been given of this Phænomenon to be futile and insignificant: and no Man of considerate Thoughts can acquiesce in them.

And I further declare that I am thoroughly perswaded that this Strange Phænomenon (as well as some others, *viz.* that of Gravity and Levity, and the Reciprocal Motion of the Sea) is not to be solved by the Principles of Matter and Motion, but that there is a Supernatural Cause to be assigned of it. I do verily believe that it was intended that this and such like Prodigious Occurrences should lead

lead us directly to the acknowledgment of a Supreme and All-Wise Agent, to whom only we can attribute such strange Effects, unless we miserably strain our Reasons, and fancy Causes where there are none. It is fit that among so many Philosophick Problems and Difficulties as there are, there should be some few that cannot possibly be resolved by a recourse to Natural Causes; that by this means the Study of *Bodies* might not extinguish the Notion and Sense of an infinitely intelligent *Mind*; that Philosophy might not shut God out of the World, but that on the contrary we might be forced to confess an Immaterial and Spiritual Being, of Immense Understanding and Wisdom. So here particularly we are gravell'd with the Attraction of the *Load-stone*, and if we speak freely and ingenuously, we must own that we know not how to render an Account of it; which without doubt was thus design'd by Providence, that we might look up to the Original Founder of all Beings, and acknowledg his Superintendency and more immediate Agency in this and some other strange Events which we meet with in the World. Here is a dull obscure Stone that hath Power to Attract Iron to it, which is denied to Diamonds and Sparkling Jewels. This one dark and unpromising Mineral is more serviceable to Mankind, as to *Navigation* which is so much improved by the Invention

L tion

tion of the Nautick Compass made useful by this *Magnetism*, than all the Precious Stones and Gemms which the Earth so charily deposits in her Bosom, and which being taken thence make such a goodly Shew in the World with their Lustre and Brightness, and which really deserve our Admiration, because they are borrowed from a Divine Light and Glory. And thus I have *in part* shew'd (for it was not my Intention to insist Largely on these things) what are the Wonders that are contain'd in the Bowels of the Earth, what are the Treasures that lie hid under ground, and which are trampled upon every Day.

And I doubt not but they are disposed of and placed in the same Order in which they were at the first Creation. Though I find it avouched lately by * One of a very Philosophick Genius, that *the whole Terraqueous Globe was at the time of the Deluge put into the Condition that we now behold it in.* He as well as the Learned *Theorist* holds the Dissolution of the Earth, but in a far different manner: for the *Theorist* makes it the Cause of the Deluge, but *his* Hypothesis is that the Deluge was the Cause of the Earth's Dissolution; and that all Metals and Minerals, and whatever else is found in the Globe of the Earth, owe their present Frame and Constitution to the Flood

* Dr. Woodward, Nat. Hist. of the Earth, Part 1.

I crave leave to dissent from this Learned Author, for tho as to the Main he has excellently performed his Task of giving us a Natural History of the Earth, and hath certainly taken the right way to compile it, founding it upon continued Observation and Matter of Fact, yet perhaps he hath gone too far in asserting the *Total Dissolution of the Earth*, for according to my Apprehension there is no need of maintaining this. It is my Perswasion that it is not very congruous to the Notion which we have of the *Divine Wisdom* and *Prudence* to dissolve the Whole Frame of the Earth, which was at first made with the utmost Art and Skill, and to make a New Settlement of things in this Globe. It is somewhat hard to adjust this to the Wise and Discreet Management of Heaven. It hath been objected by some, that the Laws of *Gravity* are not observ'd in this *Hypothesis*; i. e. the weightiest and heaviest things do not subside lowest. *Metals* are not always deepest in the Earth, and next to the Center, and yet they are heaviest: and sometimes the lightest Bodies, as *Shells*, *Bones of Fishes*, &c. are lowest of all, or at least are not placed according to the Proportion of their Weight: which shews that these Bodies did not sink by virtue of their specifick Gravity, which is the thing he asserts. But I confess I rather say this to provoke this Learned Author to *make good*

his Hypothesis in all Particulars in this nature, than to contradict what he saith about it, for I have not duly examin'd the Matter. Tho the Deluge was Universal, and in a great measure ruffled and disorder'd the uppermost Parts of the Earth, and displaced most of the Bodies which it found there, and consequently made a very great Change, yet at present I am not inclined to believe that there was (as He expresses it) *a turning all things topsie-turvy, and unhinging the whole Frame of the Globe,* and that (as he speaks in another place) *the whole Earth was taken all to pieces, and dissolved at the Deluge, and afterwards framed anew.* It will be hard to prove that Massy Stones and all other Solid Minerals and Metals lost their Solidity by the Flood. If this were so, how comes it to pass that the *Shells* (which he often speaks of) remain still? Why were they not dissolved? And why were the Particles of the *Teeth* and *Bones* of Sea-Animals (which he likewise mentions) not dissevered? How came they to escape crushing in their falling down and subsiding, which he supposeth? Yea, how come they to be in the very same Figure and Shape that they had at first, and to have no alteration? Can we think that the constituent Parts of such solid Bodies as *Stones* and *Metals* were disjoined, and that their Cohesion perfectly ceased, and yet that those lighter Bodies of *Shells*, &c. kept their Consistency,

Consistency, and underwent no Change at all? This I think is scarcely possible to be solved.

His main Proof of this Dissolution of the Earth and the Confusion that follow'd it, is the *Strata*, the *Layers* of Stone, Chalk, Marl, Gravel, Coal, Clay, &c. which he takes notice of. But I ask, why might not these be of Primitive ordering? Why may we not hold that these *Strata* were originally so disposed? I do not hitherto see any thing that hinders our Belief of this. And as for *Shells* and *Trees*, &c. that are found in the Earth, they may be (and I agree with him that they are) a Proof of the *Universal Deluge*, but they seem not to me to be an Argument of that *Total Dissolution of the Earth* which he asserts, that *Ransacking of Nature*, as he is pleased to call it. In short, I am inclined to believe that all those Orderly *Sets* or *Ranks* of different Sorts of Earth, which are every where observable, were made by the Almighty Hand before the Flood, yea most of them at the first Production of the World. But if this Curious Author should afterwards make a full Proof of what he hath propounded, yet still our Main Point is preserv'd entire; for he grants, nay professedly avers and declares that this Change of the Earth * *produced the most*

L 3

consum-

* Part 2.

consummate and absolute Order and Beauty, and that it was for the universal Good and Happiness of the whole Race of Mankind that were to come after. And (which is yet more) he proves that * this Change, this Dissolution of the Primitive Earth, and the framing of another out of it, is a great and singular Work and Argument of Providence, of Counsel and Sagacity, and he demonstrates in several Particulars that it is the Product of a Reasoning and Designing Agent. We are come then at length to the Grand Matter which I was all along aiming at, *viz.* the Proof of a Deity from *the Make and Disposal of the Earth.* Thus that of the Psalmist is evinced to be true, † *The Earth is full of thy Riches,* which he saith to convince us of the *Wisdom of God* in the Works of the Creation.

And now to close this part of my Discourse, *viz.* concerning the *Earth*, I will add a few Words concerning *Earthquakes*, which are occasioned by those *Spatious Cavities* and *Vaults*, which I have asserted before to be within the Bowels of the Earth. Some of the old Philosophers imputed this Motion to Winds and Vapours bred in these hollow Places. Others ascribe it to excessive Waters got into the Channels of the Earth by reason of excessive Rains, and agitated there in those vast Caverns.

* Part 3. † Psal. 104. 24.

Caverns. It was the Opinion of some of the Antients, that this Motion was the Effect of the Sea's beating on the Earth, and powerfully moving and shaking it: whence *Neptune* had the Title of *Ἐννοσίχθων* *Earth-shaker*, and he was call'd *Ἐννοσίχθων* and *Σεισίχθων*, which Words are of the same import. Others think it is caused wholly by the Subterraneous Fires and Sulphureous Matter in those Cavities. Thus that Admirable * Observer of the Works of Nature, whom I have frequently cited, attributes this Phænomenon to the Elevation of the Water out of the *Great Abyss* (which he supposes to be in the central Part of the Earth) by the Virtue of this underground Fire. He hath a Particular Notion of this Heat causing this Commotion and Disorder in the Earth. But I conceive that *All* these are the Causes at one time or other, nay it may be at the same time, of *Earthquakes* strictly focall'd, and *Tremblings of the Earth* which are Tendencies to them. The Winds generated in the Entrails of the Earth, may by extending the Parts in some Places cause a Tremour, or by a sudden violent Eruption occasion a Greater Motion. So by the immoderate Rains, or by Inundations of the Sea, the *Meatus* of the Earth may be washed and worn away, and other adjacent Parts may give way

L 4

and

* Dr. W. Nat. Hist. of the Earth.

and sink downwards, and, thereby cause a Motion above, if with a subsiding, in some of the extream Parts. Also the Subterraneous Sulphury Matter (of which there is great Quantity) being inflamed may produce these Concussions by extraordinary Rarefaction, which making more room must needs produce an unwonted Motion, and sometimes a horrid Noise. So that an Earthquake may be said to be a kind of a Subterranean Thunder. This was *Pliny's* Notion of old, * *Non aliud est in terrâ tremor quàm in nube tonitru.* Thus he speaks because of the Resemblance between the breaking of the *Earth* and of the *Clouds*, and the Dreadful Shock that accompanies both.

But though *Earthquakes* are thus resolved into Physical Causes, yet they are to be look'd upon as remarkable Testimonies of the Divine Power and Greatness. We cannot but own and reverence these when we consider the Dreadful Effects of these Concussions. Nay, it is hardly to be solved by any of the fore-mentioned Causes, how there can be a trembling of the *Earth* at the same moment in Places that are so *vastly distant* from one another. There was an Universal Shock almost all the World over in the Emperor *Valentinian's* time, about the Year of our Lord 369. In the Year 1601, there was a shaking of the
Earth

* Nat. Hist. l. 2. c. 70.

Earth in *Asia, Hungary, Germany, Italy, France* at the same time. In *Peru* (as *Acosta* relates) this *Tremor* oftentimes reaches near six hundred Miles from North to South. This must have an *Extraordinary Cause*, and that Man must strain his Philosophy who undertakes to give a Satisfactory Account of it from Common Principles and the Natural Efficacy of Things.

This unusual Exertment of Divine Providence we of this Nation (as well as others) have* lately felt with Surprise and Astonishment. And I hope it will be thought no *Digression* if I here remind the Reader to reflect upon it with great Thoughtfulness and Seriousness, and to consider and weigh the true Nature and Design of this amazing Event. I know there are some Persons that slight all such Occurrences, and tell us that they are from Natural Causes, and therefore it is Weakness and Vanity to trouble our selves about them; Men of Philosophy (say they) are acquainted with the Spring and Source of these Accidents, and therefore are not possess'd with Fear and Dread, and cannot be perswaded that Nature, acting in its own way, and according to its due Laws, intends us any Mischief. But the Reply to these Men is easy, for though I most willingly grant that

Earth-

* September 8. 1692.

Earthquakes, and the lesser Tendencies to them, as *Tremblings of the Earth*, are the Product of Natural Causes, yet it is as true that the God of Nature, when he is provoked by the Sinful Enormities of a People, may and often times doth turn these Natural Effects into *Punishments* and *Judgments*. So that both *Philosophy* and *Divinity* are concern'd here, and they are very well consistent. We may as *Naturalists* search into the physical Reasons of these Events; but then as we are Students in *Religion* we are bound to make a farther Enquiry, and to take notice of the Design of Heaven in these great and wonderful Effects that happen in the World. With Philosophers and Physitians we are ready to grant that Scarcity and Famine, Plague and Pestilence are naturally produced: and yet we are ascertain'd from the Sacred and Infallible Records of Scripture, that these were oftentimes inflicted by God on purpose as the Recompence of Mens heinous Sins. So it is in the present Case, (which makes it very plain) the Motion and Shaking of the Earth are to be attributed to Causes in Nature, (and I have before assigned what they are) yet we must likewise acknowledg that there is a more than Ordinary Hand to be taken notice of in this Matter: and as Understanding and Devout *Christians* we are to observe what the Purpose of Divine Providence is at such a Time.

Pursuant

Pursuant to this I offer these brief Remarks on that Signal and Stupendous Dispensation.

1. The *Antients* have thought that this was ever attended with something that was Boding and Ominous. Thus *Socrates* the Ecclesiastical Historian pronounces concerning the *Earthquake* which happen'd in the Days of the Emperors *Valentinian* and *Valens*, that it was * *τεκμήριον τῆς ἐκκλησιῶν τεραχῆς*, a certain Sign of the Shakings and Convulsions which afterwards were in the Christian Churches. And I could produce other very Grave Writers who speak to the same Effect with relation to Earthquakes that were felt in other Places. Those Commotions in the Natural World are thought to foretel greater in the Ecclesiastical and Civil.

2. The *Holy Scriptures* have particularly taken notice of this as a Sign of the Divine Anger, and as a Forerunner of great Evils and Calamities. *Thou shalt be visited of the Lord of Hosts with Earthquake, &c. Isai. 29. 6.* It was foretold by our Blessed Saviour, (*Mat. 24. 7.*) that there should be great Earthquakes in diverse Places before the final Overthrow of *Jerusalem*. And you may observe that in the Sacred Writ great Alterations, but especially those which are Mischievous and Destructive, are † express'd to
us

* Eccl. Hist. l. 2. c. 20. † Job 9. 6. Psal. 46. 2. & 60. 2. Isa. 13. 13. Joel 2. 10.

us by *Earthquakes*, by *moving and shaking the Earth*, and such like Terms. This is the *Stile* and *Language* of the *Old Testament*, yea and of the *New*, as is evident from several Passages in the * *Book of the Revelation*. And therefore my Assertion is not groundless when I say that this particular sort of Prodigies generally foresignifies some Remarkable Evils and Calamities.

3. Let us observe and consider the *Number* and *Frequency* of this kind of Events of late. Above thirty Cities and Towns in *Italy* and the adjoining Parts have felt this Dreadful Motion within a few Years. And they that converse with the History of Modern Occurrences, cannot but have informed themselves that there have been more Terrible Shakings of the Earth in the space of these last ten Years, than there were in above two (I may say 3 or 4) hundred Years before. This certainly deserves our most serious Consideration, and may assure us that some very Uncommon and Extraordinary thing is portended by these frequent and repeated Agitations of the Earth under our Feet.

4. and lastly, Let us look upon this late Trembling of that Vast Element under us as an Act of Divine Judgment and Mercy mixed together, (for we may consider it under this
double

* Rev. 6. 12. & 8. 5. & 11. 13, 19. & 16. 18.

double Notion.) First, let us view it as a *Judgment*, as a Terrible Threatning from Heaven, as a Token of God's Anger and Displeasure because of our multiplied Offences and Enormities, for this is the General Character of this Prodigious Occurrence. Let us see the Divine Hand stretched out against us, and let us speedily reform our Lives, lest our continuing in our Impenitence provoke the Almighty to cut us off speedily. Secondly, let us admire this late Visitation as it hath a Mixture of Singular *Mercy* with it. We have heard what hath been the deplorable Condition of some *Other* Countries where Earthquakes have happen'd. Great Numbers of People have been swallow'd up alive by the gaping Ground, and have been buried in the Bowels of the Earth: and the Circumstances of those that survived were unspeakably lamentable and miserable. It is the peculiar Goodness of Heaven to *us* that we have not met with the same Severity, that this late Concussion of the Earth was not of that Violent and Furious Nature, and that it proved not fatal and destructive to us. We are concern'd now to remember and practise that Advice of our Blessed Lord, *Sin no more, lest a worse thing come unto you.* I say a worse thing, for even to speak Philosophically (which some would have us to do in this Affair) if the Sulphureous Matter in that part of the Earth

Earth which is under us (or whatever else it is that is the Cause of Earthquakes) be not quite spent or dissipated, or if its Exhalations have not had vent through the subterraneous Caverns and Channels in some other Place, (it may be at a great distance from us) there is some reason to fear an After-Clap, a more fierce and vehement Shock, with a rending of the Earth, to make way for those Sulphureous Vapours. Thus even on Natural Grounds it may be suspected that this Gentle Trepidation which we have felt will be follow'd with a more Direful Commotion, and that both we and our Habitations may be interred in one Common Sepulcher. But to wave *Philosophy*, I am sure according to *Divinity* we have cause to fear that *a worse thing* will befall us, because we grow rather Worse than Better by all these things that happen to us.

If the Reader thinks fit, we will join in our *Devotion* upon this Occasion, and humbly revering the late Stroke of the Divine Hand, supplicate that the Omen may be happily prevented and averted.

O thou Eternal Being, Sovereign Lord of Heaven and Earth! Vouchsafe, we beseech Thee, that we may be fully sensible of this Judgment which Thou hast threatned us with. Thou who shewest thy self a God of Power and Vengeance, by making the Earth to tremble under its Inha-

Inhabitants, put them into the like Posture, and cause them to fear and stand in awe of Thee, to acknowledg that they deserve to be utterly destroyed for their repeated Transgressions and Offences, and that it is from thine unspeakable Patience and Long-suffering, from thine infinite Compassion and Forbearance, that so Prophane and Wicked a People are not actually consumed. O Blessed God, make this an effectual means to convince Men of thy Almighty Power and Sovereignty, of thy impartial Justice and Severity, and that thou hast Various Ways of punishing Offenders. Thou canst make All the Elements serviceable to this dreadful End. Thou didst destroy the Sinners of the Old World with an Inundation of Water; thou didst consume Sodom and the Neighbouring Cities by Fire: Thou hast often by an Infectious Air brought a devouring Pestilence on a People; and thou hast also caused the Earth to open its Mouth and swallow up rebellious Sinners. And this we might justly fear will be our Lot from thine avenging Hand. Our Crying Sins and abominable Practices have long since deserved that this Sudden and Terrible Calamity should overtake us. And now if Thou dost actually inflict it upon us, we must acknowledg Thee to be Just and Righteous, for there is no Punishment too severe for us.

*But spare us, O Thou Merciful Preserver of Men, and deal not with us according to our Demerits. Enable us to call to Mind that Terrible, but
Loving*

Loving Warning which Thou lately gavest us, and let our Behaviour be sutable to it. Let us with humble Thankfulness acknowledg thy singular Goodness and Mercy to us. Thou hast not dealt so with all People, for Thou hast shaken the Earth, and destroyed the Inhabitants of it at the same time. But Thou hast been favourable to Us, and hast only threatned us. O let this thy Goodness and Forbearance towards us lead us unto Repentance, and firm Resolves of vertuous Living. Do Thou make us so deeply apprehensive of this extraordinary Instance of thy Long-suffering and Clemency, that we may be effectually stirr'd up to render Thanks unto Thee our Preserver and Saviour, and to testify our Thankfulness in a hearty abandoning of all our evil Ways, and in turning unto Thee our Gracious God by Amendment of Life, that Thou mayest never be provoked to renew the Tokens of thy former Displeasure, and to deal more severely with us than hitherto Thou hast done. To this End be pleased to affect our Hearts with the Consideration of this late Wonderful Dispensation of thy Providence towards us. Add this to this Great Mercy and Deliverance, that we may lay it to Heart, that we may be made Better by it, that we may really improve it for thy Glory and our own Welfare both here and hereafter. Grant this, O Heavenly Father, for the Merits of Christ Jesus our Lord, to whom be Glory to eternal Ages.

None,

None, I think, but *Atheists* will refuse to say *Amen* to these Oraisons: for they resolving all things into mere Natural Principles (and by these they mean no other than Chance or a Casual Hit of Matter and Motion) will allow of no Religious Reflections on the Events that are in the World. And I wish there were none that notwithstanding their disavowing the Name of *Atheists* as reproachful, imitate them too much in this. Then we should have a happy Mixture and Conjunction of *Natural Philosophy* and *Religion*; then in all the Works of Nature we should acknowledge an Intelligent and Wise Being that is the Author and Disposer of them. So much concerning the *Earth*.

M C H A P. I

C H A P. VIII.

The Sea, with all its Treasures and Riches, is another Evidence of an Omnipotent and All-Wise Being. The several Sentiments of Writers concerning its Ebbing and Flowing are examined. The Phenomenon is resolv'd into a Supernatural Efficiency, and why. The Saltiness of the Sea-waters is in order to the Preserving them from Putrefaction. The Sea is kept within its Bounds by an Almighty Arm. God's Providence seen in making it both the Source and Receptacle of all Waters. The Theorist's Conceit of the Primitive Earth's being without Sea, refuted by Scripture and Reason. The great Usefulness of the Sea in several respects.

A Gain, the Sea furnishes us with abundant Arguments for an Invisible and Almighty Being. For what is the Sea but that great Heap of Waters which was gather'd together by God's Omnipotent *Fiat* at the Creation of the World? For he was pleased to depress some Parts of the Earth, and make them lower than the others, and so the Waters fell down thither by their own Weight, and have ever since been contained within those hollow Parts of the Earth. These are call'd

call'd *the Waters under the Earth* in the Second Commandment, because they are in those Receptacles that are below the Surface of the Earth, and which were made on purpose to receive and hold that Element for the Use and Advantage of Mankind and other Animals. But from those Discoveries that have been made concerning that Vast Element we may conclude that it encompasses the greatest Part of the Earth. *Africa* is an Island, or a Peninsula at least: *Asia* and *Europe* make one Peninsula: *America* consists of two vast Islands. Or take it according to * *Varenius's* Geography, who tells us that the four spacious Continents of *Europe*, *Asia*, *Africa* and *America*, are four Great Isles: and so is *Greenland*, and that Part of the World which is termed the *Southern* or *Magellanick Land*. So that indeed this Terrestrial Globe is made up of Islands, some greater and others less. Or, speaking more generally, we may say that the whole Earth seems to be but One Great Island.

In this † *great and wide Sea* (as the Psalmist rightly styles it) *are things creeping innumerable*: for the *Fishes* of the Sea are reckon'd among *Creeping Animals*, because they move on their Bellies in the Water, and because they are without Legs and Feet: and they are said to be *innumerable* because the Water

M 2

is

* Geogr. l. 1. † Psal. 104. 25.

is the most prolifick of all the Elements. It is emphatically said by the same Religious Observer, that *here are* not only *small* but *Great Beasts*, for there are generally Greater Animals in this watry Element than on the Earth, because of the abundant Humidity which is procreative of a more than ordinary Magnitude. But of these I am to treat distinctly afterwards, when I come to speak particularly of *Animate Creatures*. In the Sea are not only Fishes, but *Plants* proper to that Salt Element; of which sort is *Coral*, which is a stony Concretion in form of a Shrub growing in the Sea, and therefore is called by *Paracelsus* the *Sea-Tree*. Here is *Amber*, a Sulphureous Rosin of the Earth cast into the Sea, and there concreted. There are *Pearls* of a vast and almost incredible value taken out of the Deep: so that what our Saviour said of a *Merchant-man*, *Mat. 13. 46.* might be literally true, *viz.* that *he sold all he had* (his whole Estate) *to buy one Pearl*: for here God hath treasur'd up Great Riches in a small Compass. But the Sea it self is the Richest Mart in the World, God hath made the Traffick on the Ocean to be the greatest Procurer of Wealth and Abundance.

Who admires not the singular Hand of the Almighty in the *Ebbing* and *Flowing* of this huge Mass of Waters? Twice in somewhat more than four and twenty Hours there is a Reciprocation of Tides. Six Hours the Sea flows,
and

and as many Hours it ordinarily ebbs. The Cause of which strange and astonishing Phænomenon is differently assigned. Not to attend to the *Stoicks*, (who holding the World to be an *Animal*, fancied the breathing or sucking in of the Sea-water and letting it out, as Fishes do through their Gills, made this rising and falling of it) it is generally ascribed to the *Moon* because it is known by Experience that the Sea swells when the Moon is above the Horizon, and so by degrees swells yet more till it comes to the very Vertical Point: and then when it declines, the Sea Flows. Now, if it be thus, if the Sea swells when the Moon passes over the Meridian, and presses the Air and Water; and if the greatest Swellings and Flowings are at the *Equinoxes*, because the Moon then more directly and perpendicularly presses the Earth; and withal, if in full and new Moons the Motion of the Sea towards the West be more vehement and impetuous than ordinary, because the Moon is at such times nearer the Earth, and so more forcibly presses the Water, and thence causes a greater Flux than usually; if it be thus (as we are told) who can doubt whether the Phænomenon be not to be solv'd by this Planet? Yes, there is some Place for doubting, because (as * *Varenius* assures us) it is not at-

M 3

rested by the Observation and Experience of the World, that when the Moon is Vertical the Tides are always highest, and on the contrary, that when she is at the Opposite Point it is always lowest Water: which yet would necessarily happen if the Moon were the Total Cause of the Flux of the Sea.

And further, as there is not the Greatest Flux in some Places when the Moon is in its Meridian, or at the time of its Newness or Fulness; so it is true that in most Parts of the *Mediterranean*, and in the *Baltick Sea*, and on the *Northern* Shores of the *Pacifick Sea*, there is little or no swelling or flagging of the Waters. It is true these Seas do not lie so open to the Moon as the *Ocean*: yet notwithstanding this, they should have some considerable Degrees of Flux and Reflux, but they have not. The same is observable in the *Euxine Sea*, and in the *Dead Sea* in *Asia*; nor is there any regular and due Motion in the *Archipelago*. Yea, in the *Northern Ocean* beyond *Scotland*, toward *Norway* and *Green-land*, the Exaltation and Depression of the Waters are scarcely sensible. From which Instances we may gather that the *Moon* is not the compleat Efficient of the Agitation of the Sea, for then all Seas would be affected with its Influence more or less. The most that we can say is, that where this Reciprocal Motion is, it depends only in part on the Regency of the Moon. *Kepler* attributes

butes it to a *Magnetick* Virtue in the Moon, but he hath not had the Fortune to gain any to his Opinion.

Others therefore attempt to solve it another way: if the *Moon* can't effect this Reciprocation of the Sea's Motion, the *Sun* shall. Accordingly some imputed it to the Sun's raising of Vapours and Exhalations from the Sea. This was an old Opinion, for * *Plutarch* tells us that it was held by *Aristotle* and by *Heracitus*: but there seems to be little Foundation for it, because Exhalations are rais'd in all Seas, Lakes and great Waters, but there is not a Flux and Reflux in them all, as hath been already observ'd. The Younger † *Vossius* holds that this Motion is caus'd by that of the Sun, which is from East to West, and such is the Flux of the Sea. And this seems to have been the Opinion of *Pliny* and *Ptolemy* long before. But there is no ground at all for it, for the Tides may as well be imputed to the *Stars* as the Sun, seeing they as well as this move from the East. Again, 'tis to be remembred that the Sea moves from West to East in the Ebbing, and yet the Sun at the same time hath no such Motion. But there are so many and easy *Objections* (and those unanswerable) against this Hypothesis, that it would be lost time to insist on this any further.

M 4

But

* De Plac. Philos. l. 3. c. 17. † De Motu Marium.

But if neither *Sun* nor *Moon* can do the Work, the *Earth* must, according to *Galileus* and *Dr. Wallis*, who make the Motion of the *Earth* the sole Cause of the Flux and Reflux of the Sea. But first they must prove that the *Earth* moves: which will be a hard Task, though 'tis so Modish a Piece of Philosophy among the Moderns: and then they must render a Reason why Lakes, Meres and Rivers do not flow and ebb as well as the Sea, at least why they do not move in some small measure, seeing they cannot but be affected somewhat with the Agitation of the *Earth*, as well as the Broader Waters. The Learned * *Lydiat* and some others search lower for the Original of the Sea's Motion, and impute it to Subterraneous Fires. But this is very weak, for if those Fires were able to give it Motion, it would certainly give it Heat also; and the lower Men dive, the warmer they would feel the Waters to be: but I never heard of any Man that pretended to prove this.

Wherefore the Insufficiency and Weakness of these several Accounts given by Learned Men concerning the *Ebbing and Flowing* of the Sea, encline me to resolve this Phænomenon wholly into a Supernatural Cause, viz. the Power of God. Lest this should be thought to be a Piece of *Philosophical Phanaticism*, I will

* De Orig. fontium.

will give the Reader an Account of what I say. I grant it is noble and worthy of our rational Faculties to search into the Natural Causes of things, and Philosophically to unravel the Secrets of the most abstruse Effects. But when we find our selves puzzled and non-pluss'd, and are not able to trace the Effects to their Physical Causes, we ought to look up higher, and own the more Signal Finger of God. And this is our present Case, we can't apprehend any Second Causes wholly interested in the Matter that is before us: after all our Searches we find that this Wonderful Phænomenon is above the Efficiency of Natural Agents: and 'tis certain that it is worthy of the Almighty Creator that some should be so, and that for an excellent Purpose, *viz.* that we should have some Check to our Inquisitions, that we should be sensible of the Weakness and Shallowness of our Conceptions, that we should adore the Creator himself, and that we might thoroughly be convinced that the Divine Power infinitely surpasses that of Natural Efficients. For these and other Reasons which we know not of (nor is it fit we should) God sometimes acts absolutely and entirely without making use of the Natural Agency of Second Causes: he manages and performs the whole Work himself without any Concurrence of theirs. Thus by an immediate Act of his Power he every Day
puts

puts this vast Abyſs of Waters into a vehement Motion all the World over. And this Exertment of Power is accompanied with infinite Goodneſs, for it is for the real Advantage and Welfare of the Universe that this Heap of Waters is thus forcibly ſhaken by him. The alternate Motion of the Sea which is cauſed by this violent Concuffion, is for the Preſervation of that Element, and the hindrance of its being corrupted.

And I impute the *Saltneſs* of theſe Waters to this: for as for the Reaſons which ſome give of this particular Property of the Sea-water, as that it proceeds from the Rocks of foſſile Salt which are at the Bottom of the Sea, and ſometimes upon its Shores, as ſome would make us believe; or that it is the Effect of the Subterraneous Bituminous Fires, as *Lydiat* conceits; or that it is cauſed by the Aduſtion of its Particles by the Sun, as *Ariſtotle* thought, and the like; I look upon them as very imperfect and unſatisfactory Accounts. It is true it hath been obſerv'd that the Ocean is ſalter in thoſe Places which belong to the *Torrid Zone* than in thoſe that are near the *Poles*, or under them; but this ſeems not to proceed from the Sun's Heat, but from other Cauſes. There is from the Ocean near the *Equinoctial*, a greater Quantity of Water evaporated than from the more remote Seas, and this is diſſolv'd into Showers of freſh Water which fall

gene-

generally in those Places which are at a great distance from the *Equinoctial*, and qualify the Saltness of those Seas. Besides, fewer Rivers (whose Water is void of Saltness) discharge themselves into that Part of the Ocean which is near the *Equinoctial*, than into that which is near the *Poles*, and thence the former exceeds in this saline Quality. These may be the Reasons why the Ocean between the Tropicks is saltier than in the Temperate or Frigid Zones. I say further, if Saltness were produced by Heat, then there might be an Experiment of turning fresh Water into that which is salt, at least brackish, by Fire: but this was never yet done. Yea, I prove that Saltness is not from the Solar Heat, because this on the contrary changes the Nature of that Water which is salt, and makes it fresh; for the Water that is by the Heat of the Sun exhaled from the Sea, and turn'd into Showers, (as was intimated before) is not Salt. Therefore the Heat of the Sun is not the Cause of the Saltitude of the Waters. I am then of * *Varenius's* mind in this, that these salt Particles are coetaneous with the Ocean it self, and therefore we ought no more to inquire into the Original of them, than into the Original and Generation of the Sea it self, or of the whole Earth. But we may with some Satisfaction

* Geograph. l. i. c. 13.

faction rest in the *Final Cause* of this Property, which is that it may be serviceable to the same end that the Motion of this Element is, *viz.* to preserve it from Putrefaction. If the Ocean were either stagnated, or had lost its saline Quality, we should soon feel the dire Effects of it: Fishes would die, Navigation would be impossible because of the Corruption of that Element, and the Inhabitants of the whole Earth would in a short time be infected and stifled with the noxious Steams of it. Here then we cannot but own, and with Reverence admire the *Power, Goodness* and *Wisdom* of the Great Founder of the World, that he was pleas'd thus to contrive the Ocean for the Good of Mankind, and the Service of the Inhabitants of this lower World.

And these Divine Attributes are no less observable in the *Bounding* of this Vast Element. For though, it is true, it is lodg'd in the more depress'd Parts of the Earth, yet by its rapid and vehement Motion it is naturally apt to fly out of its proper Receptacles and Channels; and in many Places it hath advanced it self and gained ground, and is now in a Tendency to spread it self yet further, and to enlarge its Dominions. But the Overruling Arm of Heaven puts a stop to its Career, and checks its enraged Waves, and permits them to pass no further. This that Pious Sufferer acknowledg'd when he was de-

scribing

cribing the infinite and unsearchable Power of God, * *He hath compass'd the Waters with Bounds.* The † Hebrew Verb here used is by *Buxtorf* rendred *Circinavit*, and then the Elegancy of the Expression is very considerable, He hath as with a pair of *Compasses* exactly described the Bounds of the Sea: he hath with Divine Art and the most Accurate Skill and Wisdom terminated the boisterous Waves and raging Billows of the Ocean, he has shut it in with Mountains, Rocks and Commodious *Shores*. This is taken notice of by another Inspired Author, || *Thou hast set a Bound that they may not pass over, that they turn not again to cover the Earth,* and to overwhelm the Inhabitants of it. Especially those of the *Islands* (of which We are a Part) are concern'd to mention this with most thankful and hearty Resentments. ** *The Lord reigneth*, therefore (as the same Devout Man saith) *let the Multitude of the Isles be glad thereof.* If He were not *Lord* and *King*, if he did not rule and govern the World, and particularly this Impetuous Element, if he did not mercifully restrain and confine it, it would unavoidably break in upon us and devour us. It was unsufferable Presumption in *Xerxes* to attempt to fetter the Hellespont, it was saucy Arrogance

* Job 26. 10. † *Art. i. e. circino terminum aquæ descripsit.*
Buxt. Lexic. || *Psal. 104. 9.* ** *Psal. 97. 1.*

gance in King *Cannre* to charge the Sea not to come in upon him. And it is but a fond Superstition in the Venetian to think to espouse the Sea, and marry the *Adriatick* on Holy Thursdays. It is the Almighty Providence of Heaven only that can give Laws and Rules to the Roaring Waves. It is this only that can allay and moderate the *Deep* when *it boils like a Pot*: it is this alone that can curb and master its Fury. So the Almighty himself informs us, * *He hath shut up the Sea with Doors*; and again, † *He brake up for it his decreed Place, and set Bars and Doors, and said, Hitherto shalt thou come, but no further: and here shall thy proud Waves be stayed.*

And farther Proofs of this Divine Power we may take notice of in the Deep, if we consider that God hath made this both the Source or Origine, and also the Common Receptacle of Waters. Fountains and Springs arise not only from the *Great Abyss* of Waters in the Center of the Earth, (as a late * Worthy Writer hath rendred very probable) but from the *Ocean*, i. e. from condens'd Vapours or Waters themselves sent up from the Sea through the Earth, and by the Subterraneous Fires exhaled up to Hills and Mountains, and thereby the Cold condens'd into Waters, which supply Rivers, and are at last carried back to the

* Job 38. 8. † Ver. 10, 11. || Dr. W. Nat. Hist. of the Earth, Part 3.

the Sea. This admirable Contrivance is, as I conceive, meant in *Psal.* 104. 8. *They (i.e. the Waters) go up by the Mountains,* (by advantage of Rise they climb up through secret Passages of the Earth) *they go down by the Valleys,* (they thence fall by their natural Weight into those Places where they are most profitable for the Use of Men) and so at last *into the Place which thou hast founded for them,* they return to the *Ocean* their Great Repository. There is a Continual Circulation of Water in the Earth (as of Blood in the Bodies of Animals :) it constantly flows from Place to Place, and never stands still. From the Sea it passes to Spring-heads through Subterraneous Channels (and sometimes *Fish* as well as Water is convey'd in these Passages, if they be of any considerable largeness; whence by the way I think may be given an account of *Shell-fish* and *Bones* of other Fish, which are sometimes found in digging deep in the Ground: it is probable they came from the Sea in these Pipes under ground :) from those Spring-heads the Water is derived to Rivers (tho I grant these are partly supplied by *Rains* and *Snows*, as when sudden Inundations happen :) and from the Rivers there is a Passage into the Sea again, and thus the Waters run round as Blood in the Veins and Arteries of Living Creatures. And the circular Motion of one is as necessary for the Good of the World in general,

as

as the other is for that of Animals in particular.

There is indeed a Late Ingenious Writer that fancies the *Sea* is a Blemish to the World, and therefore he tells us that the First Earth was without any such thing. But it is no wonder that he that dreams of an Earth without *Clouds* makes it wholly void of *Seas*. Yet this is to be wondred at that any Man should aver with Confidence that the *Antediluvian Earth* was without *Sea*, when we read in *Gen. 1. 21.* that *God created great Whales*; they must be Whales on the dry Land according to this Author, for he allows no *Sea* for them; nay, when we expressly read that *God gave Adam Dominion over the Fish of the Sea*, *Gen. 1. 26, 28.* Only here again our wonder must cease when we remember what the Author hath since divulged to the World, *viz.* that the first Chapters of *Genesis* are not to be understood in a Literal, but an Allegorical Sense. So that according to this Gentleman it was an *Allegorical Sea*; and *Allegorical Fishes* too are spoken of by *Moses*, or rather by God himself: and then there is as much reason to believe that the *Earth* and the *Air* with the *Cattel* and *Fowl* in them, which are mentioned in the same Place, are *Allegorical*, and he may as well say the whole World is so too.

But it was Unphilosophically done of him, as well as against Scripture, to make the Earth destitute

destitute of *Sea* ; for if we rightly scan the Nature of things, we must acknowledg that these two cannot be separated, because the great Mass of Earth cannot subsist without a proportionable Measure of Moisture, nor can the Water be contain'd in a Place unless the Earth holds it. The Water pervades all the Parts, to be a kind of Bond to them, that the Earth may not crack, fall asunder and crumble into pieces. Again, the Water was made *to give Drink to every Beast of the Field*, *Psal.* 104. 11. and even to Man himself, whose primitive Refreshment it was. This must be derived mostly from the Sea by the Channels in the Earth, for the *Rains* and *Mists* which this Author supposes before the Flood were not sufficient for this and all other Purposes of this Element. Besides, it is an unintelligible Mystery that there should be no *Clouds*, and yet *Rain*. Likewise, the Sea-water percolated by its passing through the Earth, and at the same time mixing with it, was appointed by the Great Operator of the World to be serviceable to the Fruitfulness of the Earth, for without this (as well as Rain) no Plants, and consequently no Fruits, and (as the Consequence of that) scarcely any Animals could be nourish'd. The World then must have been in a very miserable Condition according to this Learned Author's *Theory*, which locks up all the Water of the

N World

World in the *Abyss*, so that no Body was the better for it. According to him it was well that the Frame of the Earth broke and fell down into the *Great Deep*, (and how could it do otherwise when it was made so slight?) for from that Dissolution the Earth hath been ever since universally water'd. So it seems the *Deluge* was not so much a Curse as a Blessing; for though the Inhabitants that then were, perished by it, yet ever after we have found the Benefit of it. Indeed this Author hath well husbanded the Matter by his Hypothesis, for it would have requir'd, he saith, *Eight Oceans* (though several good Mathematicians have not been of his mind) to bring that Universal Flood on the World, but he hath done it with a far less Quantity of this Element. So that it is plain he is a good Provident Philosopher, and hath saved a great deal of Water by his *Theory*. But where God and Nature are not sparing, why should we be? And why doth the *Theorist* imprison the whole Element within the Earth? So that according to him there was no *Sea* for above sixteen hundred Years: or if there was any, it was a Sea shut up and of no use. I have endeavoured to set it free, and that by Good Authority, even the Divine Law of the Creation mention'd once and again in *Genesis* 1. I have shew'd the Necessity and Usefulness of this Great Blessing to the World, and I
will

will proceed to do so yet further.

It cannot be denied that though the *Sea* seems to be very bleak and chill, yet the Influence of it is Refreshing, yea Warming. Which *Minutius Felix* was sensible of, when speaking of the Providence of God, which is so careful of the Good of the Universe, he tells us that * our *Britain* is deficient as to the Sun, but in way of Recompence is recreated and comforted by the warmth of the Sea which surrounds it. This tempers the Cold and Austerity of the Winter, and gently warms those Countries whose Shores it washes. This Secret was not unknown to *Tully*, as is clear from that Passage in his Writings, † *The Seas being stirr'd with the Winds are so warm, that a Man may thence easily perceive that there is a certain Heat contain'd in so great Moisture; for that Warmth is not to be reckon'd as external and adventitious, but as rais'd from the inmost Parts of the Ocean by Agitation.*

It was also designed by God that it should be useful for *Navigation*, and consequently for *Travelling*: for though the vast Seas which are between Countries seem to stop the Traveller, yet by the help of Ships a speedier Passage is made than if he went on dry Land. Especially since the Invention of the Sea-map

N 2

and

* *Britannia sole deficitur, sed circumstantis maris tepore recreatur.* † *De Nat. Deor. l. 2.*

and Compass we can visit the remotest Parts of the World in a far shorter time than we could have done if there had been no Seas. This the famous *Americus Vespatus*, *Columbus*, *Magellan*, and our own *Drake* and *Cavendish* could witness.

In the next place, I might adjoin this, that the *Sea* is of great use for setting Limits and Boundaries to several Kingdoms and Nations in the World. For by reason of the Interposition of this they have an intire and separated Dominion, because those Parts of the Sea which is next to them do as it were terminate and confine their Jurisdiction: and those neighbouring Waves are themselves part of it. For though the Sea be in perpetual Flux, and is not strictly and physically the same, yet it is so in respect of its Channel and the Shores it washes. A Man may have a Propriety in those things which are Variable and Transient: he hath a right to the Air and Light, and accordingly an Action lieth in case of *Nusance*, *i. e.* annoying the one, and obstructing the other. So it is with the Waters of Rivers, or of the Sea: tho they are Variable, yet they are subject to Propriety. For (as the Learned in the Law rightly tell us) things may be Common as to their Use unto All, and yet they may be Proper by Right to one Nation or Person. Thus such and such Seas are appropriated to one certain Kingdom or Country, and so become

become the peculiar and distinct *Bounds* of those Places. And withal, they are a very good Guard and Fence, they are a strong and secure Wall, especially if they surround the Region. Thus the *Sea* is of singular Use.

Moreover, let us call to mind what the Pious Psalmist saith, * *They that go down to the Sea in Ships, that do Business in great Waters, these see the Works of the Lord and his Wonders in the Deep.* They are entertain'd with variety of Wonderful Occurrences, which those at Land are Strangers to: on these prodigious Mountains of Waters they have a Prospect of those Admirable Things which others cannot reach the Sight of. And after all they are filled with Admiration and Astonishment, and must confess they cannot sufficiently † *enter into the Springs of the Sea, and walk in the search of the Depths,* as God himself speaketh.

Lastly, notwithstanding what some fantastick Men have conceited, these Waters are a Great *Ornament* to the World. The Poets, who are Good Judges in this Case, and are own'd to have Skill in determining what is Beautiful and Adorning, give their Suffrage here, for 'tis well known that in their *Descriptions* of Places they make use of this as an Embellishment. To conclude, the Earth and

N 3

Sea

* Psal. 107. 23, 24. † Job 3^d. 16.

Sea make one Beautiful Globe, and are a convincing Demonstration of the Wisdom of God in making and contriving the World, and that in such excellent Variety.

C H A P. IX.

The Wisdom and Power of God are discern'd in the Formation of Living Creatures that are Four-footed : which are distinguish'd according to their Hoofs, or their having or not having Horns, or their Chewing or not Chewing the Cud. Their Serviceableness in respect of Food, and Work or Labour. Instances of the latter Sort. Even Creeping and Groveling Animals exalt their Creator. Fishes (some of which are of a Vaster Magnitude than any other kinds of Animals) shew the distinguishing Providence of God in the peculiar Structure of their Bodies, in order to the Element they live in. Fowls are purposely shaped and contrived for the particular use they were designed for. Their Food is sometimes extraordinarily provided for them : and sometimes they are supported without it. They are observable for their being Musical, for their imitating Man's Voice, for their Beautiful Colours. Birds of Prey are generally solitary. The several Incubations of these Creatures afford Matter of singular Remark.

mark. *The wonderful Make and Contrivance of their Nests speaks a Divine Architect.*

WE have spoken of the *Inanimate World*: now I proceed to that which is *Animate*, viz. those Creatures which belong to the Sensitive and Animal Kingdom. And in these, because they have Organiz'd Bodies, the more signal Contrivance of Divinity is seen. Here chiefly the Hand of an Intelligent and Divine Author is discernable. Especially if we consider the wonderful Variety and Diversity of this sort of Beings: for they are either *Terrestrial*, *Aquatile* or *Aerial*.

The first are those living Creatures which have their abode upon the Earth, and they are either *Fourfooted* or *Reptile*. The former, which we generally call *Beasts*, are either *Whole-hoofed*, i. e. such whose Hoofs are whole and entire, and have no division at all, as the *Elephant*, *Horse*, *Ass*, *Mule*; or that have *divided Hoofs*, and they are of two Sorts.

First, Such as are *cloven into two Parts* only; and they are either, 1. *Horned Beasts*, and *Chewing the Cud*, as the *Ox*, *Cow*, *Sheep*, *Goat*, *Stag*, *Rhinoceros*. Concerning whom we may observe that the Meat which is rudely and in haste eaten by them is convey'd back to the

Mouth again, there chew'd, and then swallow'd a second time. For these Creatures want an upper set of Teeth, and therefore *Rumination* is given them to supply that defect: and they are furnish'd as it were with a double Stomach, for they fetch back the Meat which was before eaten and let down into one part of the Stomach; and they eat it again, and then send it more prepared to the other part or side of it. Or, 2. they are *without Horns*, and yet *Chew the Cud*, as the *Camel* and *Dromedary*: But as to Teeth, there is this difference between this sort of Animals and the other, that though they chew the Cud, yet they have Fore-teeth in the upper Mandible. Or 3. they *neither have Horns nor chew the Cud*, as the *Swine* or *Hippotamus*.

Secondly, There is another sort of Four-footed Animals with divided Hoofs, *viz.* those that are *Claw-footed*, i. e. whose Hoofs are divided into *more parts than two*, as the *Lion*, *Bear*, *Wolf*, *Fox*, *Tigre*, *Leopard* or *Panther*, *Dog*, *Cat*, *Mouse*, *Hare*, *Coney*, *Ape*. Tho we cannot give an exact Account or Reason of this *Difference* in Animals, yet it is reasonable to believe that the Diversity of their Nature and Shape is according to the Different Uses and Ends for which they were made. Particularly as to the difference of these Beasts relating to their *Chewing* or *not Chewing*, the Excel-

lent

lent * Dr. *Glisson* hath most divinely penetrated into this Secret of Nature, and hath discover'd the particular Reasons of it, and therein manifested the Wise Design of the Author of Nature.

And here I may be excused from saying any thing concerning the *Fabrick of Animals*, because that will be included in my Discourse of the *Body of Man*, which as to the main and substantial Parts differs not from those of other Creatures.

Likewise, the Great *Usefulness* of these Animals is so well known that I need not much enlarge upon it. Not to mention how serviceable they are for *Clothing*, several of them are for *Food*, whereby our Lives are upheld: and this was a very merciful Indulgence to Mankind, especially after that great Primitive Malediction, *Gen. 3. 17, 18.* which had so great Influence on their Bodies: and therefore these stood in need of some more than ordinary Recruits, *viz.* the active and generous Spirits which are produced by that Nutriment which is caus'd by feeding on Animals.

Others are for the Service of Man in those *Laborious Works* which are above his Strength, and which could not possibly be performed without the assistance of these robust Creatures.

* Lib. de Ventric. & Intestin.

tures. Thus *Oxen* and *Horses* are of indispensable Use in Ploughing, and other Employments in Husbandry, without which there could be no prospect of a Harvest, and consequently the whole Staff of Bread would be broken. The former of these two Creatures were heretofore (*i. e.* before the Invention or frequent Use of the stirring *Flail*) helpful in threshing or treading out the Corn: and the latter were of old most eminently useful in Battel, as they are also at this Day: to which purpose we have that Excellent Rhetorical Description of this Animal in *Job* 39. made by God himself. And besides, it is unspeakably serviceable in Journeying and Travelling, and in bearing and carrying those Burdens which are too heavy for humane Shoulders. This was antiently the Work of *Mules* and *Asses*, and is so now in Foreign Countries. Where also *Camels*, which have a Natural Pack-saddle on their Backs, shewing them to be Beasts of Burden, are very frequent, and are employ'd in those Parts of the World in the like Service. *Dromedaries*, well known in *India*, *Arabia*, *Africa*, can travel a hundred Miles a Day with great Burdens on their Backs. And both these and *Camels* are particularly prepared for it by the Wise Disposer and Moderator of all things: for they can live without Drink 4 or 5 Days, and thereby are fitted for their long Journeys in the

the Deserts where there is no Water. The *Elks* in *Swedeland* and *Livonia* and the adjacent Parts, are very swift Beasts, and are used to draw or carry: they are much swifter than Horses and of that bigness. The *Laplanders Rain-Deers* serve them for all Uses: they are Animals proper to that Country only.

The Great and Mighty *Elephant* was heretofore extreamly useful in War, (as we read in *Q. Curtius* and other Historians) and did Wonders. However, if we respect only his Vast Bulk and Proportions, he is a visible and standing Monument of the Divine Power. Which is the meaning of what is said, *Job 40. 19. He is the chief of the Ways of God*, he is *Resbith* the Beginning, the Top, the Head, the Principal of all the living Creatures made by God. Here is as'twere a Complication of Animals, here are many Beasts in one, and thence he hath his Name of *Behemoth*, i. e. as it were a *Plurality of Beasts*: for such his extraordinary Greatness seems to include in it, and thereby sets forth the Infinite Power of his Maker.

And in the all other Four-footed Animals (of which we are speaking) there are some Emanations of the Celestial Power and Virtue to be discern'd. The fecundity of the Divine Goodness is seen in the *Various Exertments* of the Animal Life in these Creatures, as the Strength of the Horse, the Ox, &c.
the

the Fierceness of the Lion, Wolf, Tigre, Leopard; the Greediness of the Swine; the Mildness of the Ass and the Sheep; the Salacity of the Goat; the Swiftiness of the Camel and Dromedary, of the Horse, the Hound, the Hare, &c. the Sagacity of the Fox and Ape; the docible Nature of the Elephant; the domestick Faithfulness of the Dog, and his Love to his Master; and all the other different displayings of the Sensitive Nature in these Beasts. For the Indulgent Creator would have all the various Species of Brutes enjoy their Essence in the way which is most agreeable to them.

The other Sort of *Terrestrial Animals* are those that are call'd *Creeping Things*, as the groveling *Serpent*, (of which there are several kinds) the slow-paced *Snail*, *Adders*, and *Snakes*, and particularly the *Rattle-snake* which makes a Noise before it is seen, and so gives warning of its being near; and abundance of other Reptile Animals which proceed from the same Infinite Source and Author. For 'tis certain that these despis'd Creatures are as beautiful in their kind in the Universe as Angels and Cherubims: and they according to their Make and Nature extol their Creator as well as these. Though we need not believe the *Mahometans* when they tell us that at the time when *Abraham* was cast into the Fire by the Chaldeans, the *Frogs* came

came and spurted Water out of their Mouths upon him, (for which Reason these Animals are in great Esteem with them, and must not be kill'd) yet we may join with them when they say that *The Coaxation of Frogs is Lauding of God*. The meanest Creature that creeps upon Earth speaks a God, praises his Name, and celebrates his Honour; for besides that its very Being and Life are the Sole Gift of an Infinite and Omnipotent Author, it is someways useful and profitable in the World, and thereby conduces to the Divine Glory.

The next Rank of Animals are those which live wholly in the Waters, *viz.* in the Sea or in Rivers, as *Fishes*. Of Living Creatures these were the first that were made, then *Birds*, and afterwards *Four-footed Beasts*, because they exceed one another in their Make and Qualities: for the Creation was Gradual, and proceeded from what was less perfect to that which was more. But though these *Aquatiles* be inferiour to other Animals, as being destitute of several Bodily Parts which the others have, yet in some respects they are equal to them, and as to their *Fruitfulness* they exceed the greatest Part of all other Creatures. These and Birds being *Oviparous* have many young Ones at a time, which is the Effect of that Blessing, *Be fruitful and multiply*, Gen. 1. 22. which (as we may observe) was particularly and peculiarly spoken

spoken to *Fish* and *Fowl*, though not exclusively of other Creatures. Indeed it was congruous to Divine Providence that there should be a very great Number and Plenty of *Fishes*, because this sort of Creatures (above all the rest) feed one upon another. Of all Animals these are of the vastest Magnitude, as the *Whale*, and all *Cetaceous Fish*. But especially *Whales*, those Mountanous Fishes, those Living Islands, those Hyperboles of Nature, exceed all other watry Animals in greatness. Therefore the singular Power and Providence of God are set forth in the Description of the *Leviathan*, Job 41. as well as in that of its Brother at Land the *Elephant*, in the foregoing Chapter. And there are other Fishes of a very large Size, as the (*Crocodile* (which is so great that *Bochart* fancies it to be meant by the *Leviathan*: and a late * French Author attempts to prove that there are no other *Dragons* in Nature but *Crocodiles*) the *Dolphin* a great lover of Men and Musick, the *Tunny*, the *Saw-fish*, and several others, which together with the lesser Inhabitants of this briny Element give Testimony to a Deity. Even these Mute Animals proclaim the Divine Power and Wisdom.

It is to be observ'd to this purpose that though Fishes have some Parts common to them

* Panchot, M. D.

them with other Animals, yet they have several that are proper and peculiar to their kind : which shews the distinguishing Providence of God in the Structure of their Bodies, and making them serviceable to those ends which they were intended for. None of them, except the Cetaceous kind, have any *Ears* or *Ear-holes*, yet they hear if several credible Writers are to be believed : nay, it is plain from this, that those who go about to take them do it Silently, for they find that Noise affrights them from coming to the Bait or Net. Fishes of the greater and more perfect kind have *Lungs* and *Breath*. But to those of the ordinary kind and size their *Gills* serve instead of *Lungs*, and with them they let in and out the *Water* which is to them in lieu of *Air*. Others who have been very Curious in their Enquiries are of opinion that they take in and emit the *Air* with their *Gills*, and so these are of the same use to them that *Lungs* are to Quadrupeds; and the Blood passes in its Circulation through the *Gills* as in Beasts through the *Lungs*. For that Fishes have a kind of Respiration, and breathe thro' these Organs, is not to be doubted, they say, whatever the *Aristotelians* have said to the contrary. Fishes have no *Eye-lids*, as other Animals have, and the reason is because they have no use of them.

Mr.

Mr. Ray hath shew'd that their Bodies are purposely shaped for their more easy Swimming. Their *Fins* answer to the * *Wings* of Birds, and cause their quick Motion. Yea some of them have such long and large Fins that they serve them to fly with. Not only † *Pliny* mentions the *Sea-swallow* and other sorts of Fishes that fly above the Water and hover in the Air a considerable time, but ‖ *Rondeletius* and our *Purchas* make mention of them, and I do not see any reason to question their Credit. This these Fishes are able to do by the extraordinary Strength of their *Fins*. And the same Parts (though not so strong) in others are the necessary Instruments of their moving so nimbly. And so are their *Tails*, which are as 'twere the Rudder to these Vessels. And in most Fishes there is an *Air-bladder* which helps them to swim. And from other Particulars which are mention'd in *Habienticks*, especially in those Curious Remarks on Fishes made by the Ingenious and Inquisitive Mr. *Willoughby*, it is evident that an Intellectual Spirit is the Author and Contriver (for there can be no other) of these Animals.

Having

* Whence *Pinna* is both a *Fin* and a *Wing*. † Nat. Hist. l. 9. c. 26, 29. ‖ De Piscib. l. 4. c. 18.

Having thus spoken of those Creatures that live on the Earth and in the Waters, let us now in the next place take a Survey of those *whose Habitation is in the Air*, or *who have Wings*; and so I take in even those whose abode is on *Land*, as Cocks, Hens, tame Geese, &c. or generally on the *Water*, as Ducks, and great Numbers of Wild-Fowl; for the original Matter of *Fish* and *Fowl* being the same, (for we read that they were both made out of the *Waters*, *Gen. 1. 20.*) it is no wonder that some of these latter affect this Element. Particularly concerning *Water-fowl* it may be observ'd that they are generally *Whole-footed*, which Structure of that part was designedly such that their Feet might be a kind of *Oars* in the Water, and thereby promote their swimming. Not only as to these but all other Feather'd Animals, we may observe with Mr. Ray, that the particular Make of their Bodies, the peculiar Configuration of those Parts which distinguish them from all other Creatures, is adapted to the use of *Flying*, which is a Property bestow'd on this Rank of Creatures, and none besides.

In order to this they are very *Light*, and in order to their Lightness they are of a Hot Temper, and very Spirituous: they have large Lungs to let in good Quantities of Air when they fly long and far. They have little Sharp Heads to cut the Air, and make
O way

way for them; they have Small and Slender Legs of an inconsiderable Weight, and their Feet are made with a convenient Breadth to shove the Air. On all these Accounts they are framed for their Work, and are by their very Make, agile, brisk and full of Expedition. It seems to be a Design of Providence that they propagate by laying of Eggs, because if they had brought forth their young ones alive, especially in considerable Numbers, they must first have born them in their Wombs, which would have been burdensom, and would have hindred their Flying. And 'tis particularly observable that the *Wing* (which is their proper Glory) is of a most astonishing Fabrick, and that the Strength of all Fowls lies in this part chiefly: whence perhaps *eber ala* is from *abar potens, robustus fuit*, or *abir fortis, robustus*. The Reader may consult that Industrious and Curious Author before-mention'd (who hath reduced all the Feather'd Tribe to their proper *Classes*.) He exactly * describes both the outward and inward parts of *Birds*, and shews the peculiar use and end of their Structure as 'tis different from that of other Animals: and he shews that they are furnish'd with Parts according to the end they were made for, and that the

Frame

* Domini Willoughbæi Ornitholog. lib. 3.

Frame of them is above the Art of finite Creatures.

The *Eyes* of Birds generally excel those of other Animals, for they flying at a good distance from the Earth, it was requisite that they should be Quick-sighted, that they might espy their Food. Because 'twas not fitting for them to have Teeth to chew their Food, they have therefore a *Double Stomach*, or their Meat is prepared both in their *Crops* and in their *Gizzards*. It is first taken into the former, and there softened and macerated, and then it is sent to be perfectly digested in the latter, which to that end is of a strong *Muscular* Substance. And that the Meat may be thoroughly concocted, they take down Pebbles and little Stones to grind it: so in the *Ostrich's* Stomach are sometimes found Stones, yea and Iron. *Albertus Magnus* and *Aldrovandus* testify on their Knowledg that they have seen this Animal swallow these, but either by vomition or excretion they ejected them.

The *Provision* which is made by the Wise Maker of all things for this sort of Creatures, especially in the extremity of Winter, when the ground is fast lock'd up with Frost, or when all things are cover'd with Snow a long time, is very wonderful. To which our Saviour (who was acquainted with the Nature and Condition of all Beings) refers when he

O 2

saith,

faith, * *Behold the Fowls of the Air : for they sow not, neither do they reap, nor gather into Barns : yet your Heavenly Father feedeth them.* He in an extraordinary and sometimes inconceivable way provides Food for them, without their taking any care about it. This one Consideration, if it were pursued (by the Helps which we have from Natural History, wherein the strange ways of furnishing these Creatures with Food are mention'd) would lead us to a firm Belief of God's Providence. When our Great Instructor bids us *consider the Ravens*, Luke 12. 24. he acquaints us that there is something extraordinary in the Provision made for those greedy devouring Creatures. And he that was an Eminent Type of our Lord had long before observ'd that *God feedeth the Young Ravens*, Psal. 147. 9. the Emphasis and Force of which Words may be learnt from Mr. *Willoughby* in his *Ornithologia*, where he tells us that Ravens newly hatch'd are not fed by the old ones, (as the young ones of other Birds are) but are abandon'd by them for a time, and by the special Provision of Heaven are nourish'd with the Yolk of the Egg remaining in the Belly after exclusion: for a good part of the Yolk is received into the Cavity of the Belly in these Birds when they are newly hatch'd, which being by de-
grees

* Mar. 6. 26.

grees convey'd into the Guts by a certain Passage, serves to nourish the young ones newly excluded.

And we shall be further perswaded of Divine Providence when we consider that many of the Winged Nation are maintain'd and supported a long time without Food. *Swallows* feed upon Gnats and Flies and other Insects in the Air; which, when the Weather begins to be cold, disappear, and therefore go away because there are no more of these Insects to feed on. But how they fare in their Travels is hard to tell, *viz.* whether they meet with some kind of Food in those Places to which they repair, or whether they subsist without any, which is most probable. For it hath been found that they immure themselves in holes, and lie there till the Summer comes; for 'tis certain that several Animals, as well as these, live some Months without taking any Food. And *Sennertus* and other Physicians give some Examples of the like among Men and Women.

This sort of Creatures which I am now speaking of (I mean *Birds* in general) are hot and dry, yet they drink but little, which goes into the Habit of their Bodies; for they (as *Fishes*) have no *Bladder* to hold any Urine, that their Bodies may be the lighter, and be fitter to move in a fluid Element, *i. e.* to fly or swim in the Air. But these small *Drinkers*

are great *Singers*: which that Divine and Inspired Poet, who is so diligent an Observer of all the Works of the Creation, takes notice of, *Psal.* 104. 12. *They sing among the Branches*, they take pleasure in frequenting of Groves, they love to exercise their Natural Musick among Trees, according to that description which *Virgil* gives of them,

Æthera mulcebant cantu, lucòque volabant.

One reason why they are more Musical than other Creatures, is because they are of a hotter Complexion, and therefore require more Breath and Air to cool them, and consequently make more Noise, and more Variety of it. They are the *Male* Birds that sing most, whilst others are generally mute, for those are endued with a greater natural Heat than these; and moreover by the Musick of their Voice they charm their Females, and allure them to their Pleasure. And as these Creatures sing naturally and without teaching, so some of them are taught to speak, or to imitate a Man's Voice and Singing, which is from a peculiar Conformation of those Organs which are serviceable to the Voice, and is in no other Animals besides. In this they are Pleasurable and Delightful, and give a great Diversion to Mankind, which God
was

was pleas'd to make one end of the Creation.

Some of them are observable for the Variety and Beauty of the *Colours* with which they are adorn'd. Even these are Arguments of a Divine Hand, or else God himself would not have mentioned his *giving goodly Wings* (or *Feathers*) unto the Peacock among his other Great and Admirable Works, *Job* 39. 13. How the generality of Fowls are really profitable and advantageous in respect of Food (and that of the choicest kind) is so well known that it need not be enlarg'd upon. And as for *Birds of Prey* (which have their Use likewise) it is observ'd by a Learned Enquirer into these things, that generally they are not *Gregarious*, i. e. they do not live and fly together in Companies, which is by a singular Providence, for should they come in Flocks, and jointly set upon Cattel, they would do a vast deal of Mischief.

If next we should speak of the *several Incubations* of Volatile Animals (from the appearance of the *Punctum Saliens*, the little bloody capering Spot, the first Essay and Rudiment of Life, to the daily Advances of it, and even to the time of the breaking their Shells and coming forth, which are all accurately described by Dr. *Harvy*) we should find very Remarkable things to entertain our thoughts, and to cause us to acknowledg (as that Noble Observer of-

ten doth) an Incorporeal and Divine Author of them. And it may be therein we might read Lectures of Our selves and our Own Origination, for it is no incredible Paradox that all Animals, yea even the whole Race of Mankind (as well as *Castor* and *Pollux* were thought to be) are of an *Egg*. And the little *Sanguine Point* is the like in Man that is in other Creatures; but whether its Motion be *Dancing* or *Trembling*, whether it be a Pre-sage of Joy or Sorrow in our Lives, is uncertain.

The *Nests* of Birds are undeniable Evidences of an Over-ruling Wisdom and Prudence. These Warm Lodgings which they frame for themselves and their young ones are of all Shapes. Some are flat, some elevated: some round, some semicircular: some hanging, some lying: some Horizontal, some Perpendicular: some quite open above, some ceiled and closed wholly, some in part only: some are lined and matted as'twere: some seem to be plaister'd with great Art. And it is remarkable that Birds of the same kind make their Nests always of the same Materials, and lay'd in the same Order and Figure; so that by the Make of the Nest we may certainly gather what Bird's Nest it is. Now, whence can this so neat, so commodious, so exact Architecture proceed but from a Divine Director? For these Animals have of themselves

selves no understanding of the Means and the End, and of the Subordination of one to the other: and yet they constantly act as if they perfectly understood these. Wherefore unless we will assert them to be Rational Creatures, *i.e.* to be like our selves, which is to say that *Birds* are *Men*, we must confess that they are acted by an Intelligent Agent; and thence it is that they erect, build, shape, and sometimes conceal their *Nests* with unimitable Art, Contrivance and Cunning; and they hatch and bring up, and protect their Young with indefatigable Care and Industry, and even with the danger of their Lives. Tho they are void of Counsel and Reason, yet by the Direction of a Supream Guide they perpetually tend to those Ends which they have no knowledg of.

And it is observable further that when one of these Creatures varies from the common Instinct of Nature, and shews no natural Affection and Tenderneſs in hatching or feeding its Young, yet then there is Provision made for them. The *Raven* mention'd before doth sometimes leave her Brood, yet you have heard how they are taken care of. The *Cuckow* builds no Nest, as other Birds do, nor sits upon or hatches its own Eggs, but finding the Nest of some other Bird, devours the Eggs she there finds, and in the room thereof lays her own, and accordingly they are hatch'd
by

by the other Bird. *The Ostrich leaves her Eggs in the Earth* (Job 39.14.) in the *Lybian Sands*; but there they are hatch'd and brought to maturity by the Heat of the Sun: and this seems to be a particular Act of Providence, because this great and heavy Creature would crush the Eggs with its weight.

C H A P. X.

In the Smallness of Insects is display'd the Skill of the Divine Artificer. A Flie is of a wonderful Make. The Omnipotent Deity is discernable in a Bee, and in a Silk-worm. The Ant is more largely consider'd, viz. as to its Indefatigable Industry and Sagacity: both which are celebrated by all sorts of Antient Writers. The admirable Artifice of the Spider in making and hanging her Web, and catching her Prey. A Flea is the Workmanship of Divinity. Mites have Organized Bodies.

TO *Winged and Flying Animals* belong *Insects* which are an inferiour sort of them, as *Moths, Beetles, Hornets, Wasps, Gnats, Flies, Bees, Silk-worms, Ants.* Which, though they be small Creatures, are big with Wonders, and shew forth God's Omnipotence and Wisdom, For as *Apelles* and *Pro-*
togenes

Progenes two Eminent Painters of old were known by their Subtile Lines, and grew famous for them, so in this great Table of the World the Smallness of the Strokes which are drawn argues the exquisite Skill of the Great Limner. Those are esteemed the Skillfullest Artificers that can shew most Art in the least Space and Compass. The *Iliads* shut up in a Nut-shell were large Testimonies of the Artist's Skill. * *Callicrates* the Lacedemonian was much celebrated for making Flies and the least Insects in Ivory. * And *Myrmecides* the Milesian who was famous for the like Art, declared that he employ'd more time in making a Bee than the most unskilful Workman did in building a House. And he was applauded for his expence of Time and Art, who under the shadow of a Flie's Wing exactly pourtraied a Chariot and Horses. Thus is it with the Works of Nature and Providence: the more Minute they are, the more Wonderful. Nature is thrifty here, and shuts up much in a little room. It studieth to be Compendious, and to Epitomize its Art. It is true, all things are equally possible and easy to the Omnipotent Maker and Artist: yet if we consider the Workmanship in it self, we shall conclude with *Pliny*, that † *Nature never shews it self*

* * *Ælian. Hist. Animal.* † *Natura nusquam magis quam in minimis est. Nat. Hist. l. 11. c. 2.*

self Greater than in the least - things.

A *Gnat*, if we barely respect the Contractedness of its Make and Proportions, and the fineness of its Limbs and Organs, is on that account more considerable than an Ox. And a *Flie* on the same consideration is more wonderful than an Elephant. This little Animal (as well as that Great one) hath a Snout or Trunk wherewith it takes in all its Food. It is studied from Head to Tail with Silver and black Armour: it hath a fuzzy kind of Substance like little Sponges wherewith the Soles of its Feet are lined, and this is filled with a viscous Liquor which it can at Pleasure squeeze out, and so glew it self to the Place it walks on, especially when it walks with its Back downwards, in an inverted Position. Besides these Creatures have their Legs slit at the End into Toes or little Claws, by which they lay hold on the Rugosities and Inequalities of Bodies. And much more hath been discover'd by those Modern Glasses, which lay open even the minutest Particles and Atoms in Bodies of the least Size. There are the Words of an * Excellent Divine and Philosopher, " The least Flies, saith he, have the
 " Proportion of their Members as just as
 " those of other Animals; yea it seems that
 " God hath given them more Ornaments to
 " recompense the Smalness of their Bodies:
 " they

* Malebranch, *Search after Truth*, B. I. ch. 6.

“ they have Crowns, Helmets and other Cur-
“ riosities on their Heads which outdo the
“ most luxuriant Fancies of Men ; and I may
“ confidently aver that they who have ne-
“ ver seen any thing but with their naked
“ Eye, have never beheld any thing so fine,
“ so exact, and even so magnificent in the
“ Houses of the Greatest Princes, as what we
“ discover with Microscopes upon the Head
“ of a silly Flie. *The Eye of a Flie* (saith our
Christian Philosopher, Mr. Boyle) *is a more*
curious piece of Workmanship than the Sun it
self. Another Great Searcher into Nature
tells us * “ that if a Man would spend his
“ whole Life in the study of a poor Flie,
“ there would be such a Confluence of so
“ many wonderful and difficult things exhi-
“ bited in it, that it would still leave much
“ more undiscovered than the most singu-
“ lar Wit ever yet attained.

Bees are Creatures of singular use to Man-
kind, whether we respect their *Honey* or their
Wax. And because of their great servicea-
bleness they are to be found not only in hot
Countries but those that are very Cold.
There are abundance of them in *Muscovy*,
there are whole *Forests* of them in those Parts,
as Modern Authors assure us. These Crea-
tures are remarkable for the Admirable Stru-
cture

* *Judg Hale's Contemplations.*

cture of their Bodies, which is made agreeable to the particular Ends of their Creation. They are notable for their Great Industry, Toil and Labour in *gathering* their Honey, and for their as strangely Sagacious and Provident *Laying it up* in their Hives against Winter. To which purpose they make their *Combs*, and contrive their various *Cells* in them with astonishing Architecture, and they cover them with Wax to keep the Liquor from spilling. The *Seventy Interpreters* had so great an Esteem of this Creature for these excellent Qualities, that they made bold, after what is said of the *Ant*, Prov. 6. 6. to add this, * *Go to the Bee and learn how laborious it is, and how noble and gallant a work it exerciseth it self about, by whose Labours both Kings and meaner Persons are furnish'd with a wholesom Food. It is a lovely and glorious Creature, and though it be but weak and feeble, yet it ought to have preheminance for its great Wisdom.* And though this be neither in the *Hebrew, Chaldee, Syriack or Latin*, yet you will find it mentioned by some of the † *Fathers* as a memorable Passage concerning this Animal. Now, no Person of composed Thoughts can deny that these Propensities, these Instincts, these Actions which are so observable and wonderful in this Insect, are the
Im-

* Περὲνθητι πρὸς τὴν μέλισσαν, &c. † Clem. Alex. Strom. 1.
Basil. Homil. 8. in Hexaem.

Impression of God and no other. These Creatures have also a kind of Government and Conduct: And, if we may credit * One that hath made it his Business to enquire into the Polity of them, it is a Female Monarchy. There is a Queen, not a King of Bees, as was thought heretofore by † the Antients. However, this is unquestionable that they observe a very strict Order and Discipline, and there is both Encouragement and Correction when they see Occasion. They prudently unite their Forces, and work in common; they jointly build their Cells, and furnish their Store-houses for future Exigence, as *Virgil*, rather like a Natural Philosopher than a Poet, describes them in the last Book of his *Georgicks*. This is all from an Omnipotent and All-Wise Deity, and cannot be otherwise: which occasion'd some Antient Philosophers to think,

|| *Esse apibus partem divinae mentis, —*

That these Working and Politick Creatures had Souls in them that were Portions of the Divine Mind. So far were they from thinking (with some of late) that Inert Matter could do all this.

Again,

* *Mr. Butler.* † *Aristotl. hist. an. l. 5. c. 21. Senec. de Clem. l. 1. c. 19. Plin. l. 11. c. 17.* || *Virg. Geor. 4.*

Again, the stupendous things which are related concerning the *Silk-worm*, (which I reckon among the *Flying Insects*, because, as you shall hear, after all its changings and shiftings it is a *Butterfly*) and are known to be really true, attest a more than Natural Principle and Power. This Insect is first produced of an Egg, which comes to be a small Worm or Caterpillar, and feeds on Mulberry Leaves: being put into a Box it spins it self all into a silken Substance: then it dies, and afterwards lives again, and hath Wings like a *Butterfly*; and then before it dies again, it lays Eggs, which produce Silkworms, and so the Race of them is propagated. * And all these strange Changes, these wonderful Metamorphoses, are wrought in this Insect in six Months. It is to be observ'd also that it renews its Life with the Year, and not before things are ready for its Sustenance. For it lies dead all Winter long, and lives not till after the Spring, *i. e.* when the Mulberry-tree Leaves are grown, which are its Food. The Eggen-livens accordingly as this Tree blossoms. Or, if these Silkworms, were Flies at first (as a † late Learned Naturalist asserts, telling us that were only clothed with a certain Skin or Coat that hid their natural Shape, which afterwards

* See Malpighius de Bombyce, where he gives a particular account of its Production, Structure, Food, Growth, Generation and Workmanship of making Silk. † Swammerdam de Insect.

terwards wore off) yet the several Steps and Preparations to it are very Remarkable and full of wonder.

And then their making of Silk out of their Bellies, the putting it out with incredible Swiftneſs, and drawing it ſo ſubtile, and to ſuch a vaſt length, are as ſurprizing as any thing that hath been hitherto ſaid. By reaſon of which excellent Workmanſhip they are of far greater value than all the Plants and Canes from whence a great part of the Silk of the *East-Indies* and *Persia* are derived. By this means this ſorry contemptible Animal, this winged Worm is of ſuch great uſe in the World; by this means this little deſpicable Inſect becomes more profitable and ſerviceable to Man than the Vaſt Elephant and Prodigious Whale. Upon all which Conſiderations this ſingle Creature is an unanſwerable Argument of an Intelligent and Wiſe Contriver, from whom alone it could have Power and as 'twere Wiſdom to effect all theſe wondrous things.

And ſuch alſo is the *Ant* or *Piſmire*, which I reckon among the *Winged Inſects* becauſe it hath (as I have often obſerv'd) Wings in one part of the Summer. This is a Laborious and Provident Animal, and is repreſented as ſuch by that Inſpired Philoſopher, *Prov. 6. 8.* *She provideth her Meat in the Summer, and gathereth her Food in the Harveſt.* In which

Words these two excellent Properties of this Animal are propounded to us, *viz.* her Diligence and her Wisdom. The First appears in that *she provides her Meat, she gathers her Food.* Which is largely express'd in Natural History, where we are told that these little Labourers gather Grains of Corn in the Fields, and with great Pains and Sweating bear them to their Repositories which they have provided. The Burdens they carry are many times greater than their Bodies. They bear some of the smaller Grains in their little Mouths, and the greater ones they sometimes shove on with their Feet, and sometimes lift with Head and Shoulders. They join in the Work and help one another in carrying and drawing their Burdens. If the Grain be too big a Load, they divide it: if it be dampish, they lay it out to dry in the Sun and open Air. If one of them that is not loaden meet another in one of their Narrow Paths, he will give him the Way. Nor length, nor roughness of the Way, nor the most scorching Heat of the Sun make these little Porters give over their Work: nay at full Moons they ply it hard all Night. Thus are they Indefatigable in the *gathering* and *providing of their Food*: and *Diligence* is here commended to us under those Expressions.

Secondly, the *Wisdom* and *Prudence* of these Creatures are remarkable, which appear in
taking

taking the fittest Seasons for Labour, the *Summer* and *Harvest*, and in that which is implied in this, *viz.* providing for the Future, laying up store against Winter. Here it is to be noted, that this is meant of this sort of Insects in the *Eastern* Countries; for an Observing Naturalist tells us, that he could never find that *Ants* in *England*, or in these *Northern* Regions, store up Grains of Corn. Therefore we must not judg concerning this Creature from what we see at home: we must not question what Authors have said of it, although we discern no such thing in it in our own Country. I confess it is something hard to believe what *Herodotus* saith, that the *Indian Ants* are as big as Sheep, though *Busbequius* (a very Credible Author) saith the same. But this is certain that the same Species of Animals differ very much according to the different Climates and Regions they are in: some Qualities that are observ'd in the one are not in the other. Thus, notwithstanding what we know concerning *Ants* in this Country, all Natural Historians unanimously report that in others they are great Hoarders of Corn, and thereby make Provision for the Winter. And they observe, that lest the Corn they carry to their Granaries should put forth and grow, they bite it at one end: and thence some think they have their Name *Nemalah* from *Namal praeidere, circumcidere*, because

P 2

they

they bite off the ends of Grains or Seeds to prevent their Growth, though *Dr. Brown* in his *Vulgar Errors* saith this is no Security against the growing of Corn. But whether this be true or no, 'tis certain that these Industrious Gatherers lay up their Provision safe in their Cells which they dig and make under Ground, that they may be stock'd with Food to serve them all Winter.

There are other Instances of their *Wisdom* in Natural History : they dispose and manage their Affairs in good order, they have among them the form of a well-govern'd Commonwealth. Yea *Pliny* saith they have their set Fairs and Markets whither they come in great Companies, and do as it were establish Leagues of Friendship, and converse with one another. They bury their dead, they teach the young to labour, and the idle they expel. They have generally three Cells or Houses ; in one they live, in the other they breed, and in the third they keep their Corn. And to inhanse the Wonderfulness of their Transactions, *Solomon* adjoins that *they have no Guide, Overseer or Ruler*, they have not a particular Lord or Governour set over them, they are not under any One's Command, as the Bees are. They are reckon'd by *Aristotle* among those Animals that are ἀναρχαί, that have no Governour, and yet they act as orderly as if they had.

The

The *Wise Man* here advises the *Sluggard* to go to this dumb Teacher, who instructs not by Voice but Example, and he bids him *consider her ways*, i. e. (according to the Hebrew Phrase, and indeed the Stile of most Nations) her Manners and way of Living: unless you will chuse rather to embrace the Interpretation of the Learned *Bochart*, who by *Ways* understands the several *Paths* and *Tracts* of the Ant. It is useful to *consider*, to observe how orderly and regular these Creatures are in their *Passages*, *Intercourses*, and Journies. It is worth our taking notice how busily they travel, and by the often trampling of their little Feet wear a Path even in hard Flint-stones, how they disturb not one another in their Walks, but (as hath been said already) courteously give way to one another, and help one another in their Journies, how they bear one anothers Burdens, and ease one another if they see any overloaded. Thus *consider their ways*, saith *Solomon*, and thereby learn to *be wise*, so wise as to follow their Example of Industry and Wisdom, so wise as by this Natural History to admire and own the Creator, who hath given them this singular Instinct.

And not only *Solomon*, but several Philosophers, Poets, Orators, Historians, Fathers, have celebrated the Industry and Sagacity of the Ant. * *Aristotle*, † *Pliny*, || *Ælian*, have
P 3 given

* Hist. Animal. l. 9. c. 38. † Nat. Hist. l. 11. & 30. || Var. Hist. l. 1. c. 12.

given us a particular account of these: and the last of them is of opinion that these Creatures have * a certain kind of Divining Sense. What words shall I use, saith † Plutarch, to express sufficiently the Diligence of the Pismires? It is a difficult Task to give a perfect account of the whole Oeconomy and Apparatus of these Creatures. There is not among all the Great things of Nature a sight of Greater Wonders than they. Among the Egyptians they were a Symbol or Hieroglyphick of Knowledg and Prudence. And so among the Arabians they are a Representative of the same Vertues. The Ant is mentioned by Horace as an Example of Industry,

|| *Parvula (nam exemplo est) magni Formica laboris.*

And in respect of its providing against Winter, it is said by him to be

——— *Haud ignara ac non incauta futuri.*

And its living in Winter on what it had laid up in Summer is thus expressed,

——— *Utitur ante
Quasitis sapiens.* ———

Virgil

* Μαγιστὴς τῆς αἰσθητικῆς. † De Solert. Animal. || Sat. I.

Virgil in his fourth *Aeneid* describes them well, and so doth *Ovid* in the 7th Book of his *Metamorphosis*. *Tully* play'd the Orator highly when he said, * that in the Ant there is not only Sense but Mind, Reason and Memory. The best Wits both sacred and profane have touch'd upon this Subject. *Epiphanius* in his *Physiologus* hath several things concerning their Industrious Providence. And (that you may see all Persons conspiring in this Theme) the Jewish Doctors have an Exhortation to Prudence in these words, *My Son, take heed that the Ant be not wiser than thee, whilst that provides her self Food in the Summer to serve her when the Winter comes, and thou spendest all the Day in Sloth and Idleness*. Thus the Wisdom of this little Insect is acknowledged and made use of by all sorts of Persons: and we know it could not have this Excellent Property of it self, therefore it is an Argument of Divine Wisdom acting in it.

Whether the *Cochinele* is to be numbred among the *Volatile Insects* I am not certain, but we are inform'd from several Modern Relations, that it is a little Animal (for few, I think, will give Credit to *Pomet*, in his History of Drugs, that it is a Plant or Grain) bred on a little Tree or Shrub in the *West-Indies*, and that whole Gardens there are stock'd

P 4

with

* In formicâ non modò sensus, sed etiam mens, ratio, memoria. De Nat. Deor. l. 3.

with it, which the People gather twice a Year from the Trees. They are of great use, for they yield an Excellent Colour, which is used in *Dying* and *Painting*: and they are also useful in a *Medical* way, as being very Cordial.

And besides *Flying Insects* there are *Creeping ones*; and all small Vermin are reckon'd in this number. Even these are in their kind a Proof of a God, yea and a very Considerable one: for in these Little Animals we as plainly read the Characters of a Deity as in those of a Larger Volume. For these contain a great deal in a little; and the Lesser they are the more Admirable is their Frame, and consequently their Author is on that account to be the more admired. How wonderfully artificial is the *Spider's Web* or *House*, as 'tis call'd in the Hebrew, *Job* 8. 14? How curious is the Architecture? How fine and delicate a Thread doth it spin? how thin and soft a Web doth it weave? And therefore no meaner an Author than *Aristotle* tells us that Spinning and Weaving were first learn'd from the Spider. Thence with respect to this Curious Weaving or Spinning it hath its Greek Name ἀράχνης, and Latin *Aranea*, and French *Araigne*, from the Hebrew *arag nevit*, *texuit*, or *arach textura*: and 'tis not improbable that our English word *Spider* is but a Corruption of *Spinner*, for *Spinn* is the German word for *Spider*. And with this agrees that Poetick Fancy, that *Arachne*
an

an Excellent *Spinster* was by *Pallas* turn'd into a *Spider*. The Web which this Creature works and spins out of its Bowels, is by it framed on purpose to be a Net or Trap to catch Flies, which are a great part of her Livelihood. And that you may be perswaded of the truth of what *Solomon* saith, that the Spider is *one of those things which are exceeding wise*, Prov. 30. 24. you may observe that this Web is with admirable Art and Subtilty fram'd by her for that very end. It is hung and fastned according to the Rules of Mathematicks, for the Lines of it are drawn exactly from the Center to the Circumference; and back again from the Circumference to the Center with parallel Distances. It is from the Accuracy of this Geometrick Workmanship, that this Cunning Artist immediately feels the touching of its Web by a Fly, or any such other little Insect, whereupon it forthwith seizes on it as Prey. And that this may the more effectually be done, this Hunter after he hath spread his Net, cunningly hides himself in his Covert, that the Flies may not espy him. And if we may credit * one who hath been very conversant with this sort of Creatures, this alone, of all Animals, hath a multiplicity of Eyes, and so its extraordinary Sight as well as Feeling fits it for its Work, both which are a Divine Donation.

Some

Some by the help of Microscopes have discovered very Remarkable things in the Structure of *Lice* and *Fleas* (for a True *Virtuoso* hath Glasses for these as well as for the *Stars*). *Muffet* and *Power* tell us of the esclop'd Protuberancies of the Body of a Louse, and the Gantlet-work of all its Parts. They tell us that the Heads, Bodies and Limbs of *Fleas* are of polish'd Armour-work; and, that we may not wonder how these puny Creatures can frisk and curvet in their heavy Armour, we must know that this is most artificially fastned and jointed with Jemmars, which are so excellently contriv'd that they facilitate the nimble Motion of all the Parts. The reason why they are thus armed *Cap-a-pe*, like *Cuirassers* in War, is that they might not be hurt by the great Leaps they take: to which purpose they have an excellent Eye, the better to look before they leap. At their Snouts is fix'd a Proboscis or hollow Trunk, by which they both punch the Skin and suck the Blood through it, leaving that Central Spot in the middle of the Flea-biting where the Proboscis or Probe entred. And many other Notable Observations there are concerning this silly Insect, from whence we may gather it is the Workmanship of some Divine Hand. Wherefore it was St. *Augustine's* devout Query, *Quis disposuit membra culicis & pulicis?* Who hath disposed and set in order the several Joints and Members

Members of a *Gnat* or a *Flea*? Who hath given them that excellent Contexture of Parts?

Lastly, *Mites*, Nature's *minimum quod sic*, a thousand whereof do not weigh one single Grain, are of a Structure that is most strange and wonderful. Those that have taken pains to search into these Diminutive Beings by the assistance of Modern Glasses, (those *Spectacles* whereby we may see to read the smallest Hand of Nature) acquaint us that they have peculiar Vessels to convey their Spirits, and have Parts and Organs inservient to Sensation, Nutrition, Motion, &c. Here we may behold and admire in what narrow Bounds, in how little a Particle of Matter Life may be exerted, and exercise all its different Functions. And all the Men under Heaven (and I might add, all the Angels in it) are not able to give these Powers of Life and Sense to any Being, nor have they Skill or Ability to restore them to them when they are deprived of them. Therefore here we discern the true Source of Life and of Existence it self, even Him who is so often call'd in a signal manner the *Living God*.

To conclude, as *Solomon* saith of the Ants, so we may say of all Insects, *they are a People not strong*, Prov. 30. 25. they are puny and feeble Creatures, and some of them may seem to be altogether Useless, and might very well be spared in the Great Heap of Beings: if they

they were wholly destroy'd and all the Brood of them annihilated, it may seem a Courtesy to Mankind, who are often pester'd with them. But this is the reasoning of Ignorance and Presumption, for it becomes us not to dislike the Workmanship of Heaven, be it never so little and weak: and we must remember that what it wants in Bulk and Strength is recompensed some other way. An Insect is an Argument of the Divine Wisdom as well as an Animal of the first Magnitude. Even the pettiest Creatures in some respect far surpass these.

C H A P. XI.

It is from a Divine Author that all Animals are fashion'd and contrived in their Parts and Organs, in their Senses and Faculties, according to the Employment, Use and End for which they are serviceable. The Natural Propension in them to propagate their Kind is from God. So is their Sagacity. This latter is voted for Reason by some Writers; who also attribute Speech to them. It is proved that this is groundlessly asserted, and that Reason is the sole Prerogative of those Beings that are capable of Religion. To those who object the Uselessness, nay Hurtfulness of several Animals, (as if this were an Argument against Providence) it is answered, 1. Though we are

not

not able to assign the Use of some Creatures, yet it doth not follow thence that they are Useless. 2. The Creatures which seem most Vile are a Foil to the rest. 3. There is something worthy of our Observation in every one of them. 4. Some of these are Food for others. 5. Most of them are useful to Mankind in a Medical way. The Author's Conjecture concerning the benefit of Gnats, Fleas, Lice, Flies, Spiders. Venomous Creatures carry an Antidote with them. 6. The most hurtful Animals may be beneficial to Man as Crosses and Afflictions are, which are welcome to the Vertuous. 7. That they generally do so little harm, when they are able to do so much, is a Manifestation of the Divine Care and Providence. 8. The Enjoyment of their Essence is from the Divine Bounty, which none ought to repine at. 9. They are made use of by God sometimes to plague notorious Offenders. Lastly, That any Creatures are Noxious, proceeds from the Sin of Man, and the Curse which followed it: wherefore we have no reason to complain of them, or to question the Goodness and Providence of God. The Vast Numbers and Various Kinds of Insects are some Proof of their Usefulness. All Creatures are someways Good, and made for some Use. Though we do not see their Usefulness at present, after-Ages may discover it.

THUS

THUS I have particularly instanced in the Works of the Creation, and have shew'd that the Existence and Providence of God are to be seen in them all. Especially as to *Animals*, this grand Truth appears to be undeniable, viz. that they are all fram'd and shap'd exactly according to the several Ends and Uses they were designed for: which is an irrefragable Evidence of an infinitely Wise Contriver and Disposer. The *Hare* and *Hart* that are very *fearful* have *swift Feet* to fly away: and the timorous *Dove* hath *swift Wings*. So the most fearful Animals have the *quickest hearing*, as the *Hart* and *Hare*, the *Coney*, &c. by this means Nature takes care for their Safety, that they may secure themselves by flight. To the *Boar* that is fierce and pugnacious are given prominent *Tusks*, to the *Lion* *Teeth* and *Paws* of a peculiar make. Beasts that have no other way to defend themselves are supplied with *Horns*. Those Creatures which are for working or travelling, as Oxen, Horses, Mules, Asses, Camels, Dromedaries have such *Hoofs* as are capable of being shod that they may thereby be the more serviceable. To Birds are given *Feathers*, for the Lightness of their flying, and also *Claws* and Beaks as proper Instruments in order to the Food they live upon. And briefly, all Animals are furnish'd with proper Organs. Fowls are furnish'd

ted by the frame of their Bodies to the Element they converse in. So Fishes are shaped purposely for the Water, and Beasts for the Earth: and all the Parts of these several Animals are accommodated to their peculiar Uses and Purposes. * God hath given them particular Figures and Operations as to their Bodies according to the Indoles of their sensitive Souls, as *Aristotle* well said, if he be rightly quoted by one of the Antients. Their outward Texture is fitted to their inward Faculty and Nature. There are certain Reasons to be assign'd of every distinct frame of Bodies in Brutes. It is not without cause that they are thus and thus shap'd, and not otherwise: and whence is this but from a Divine Author?

Also, the Natural Instinct which is in these Creatures to propagate their Kind, shews that it was from a Higher Power and Principle, that is, such a one that is Intelligent, and intends the Good and Preservation of the World. And Providence is particularly seen in this, that Animals that are shorter liv'd have a great many little ones, and produce them often, as *Dogs, Swine, all Birds and Fishes*; the frequent Production repairing the short living. But those Creatures that live longer breed seldomer, and one at a time generally, as *Elephants, Deers, Horses, &c.* And here 'tis observable

* Κατὰ τὰ ἥθη τῶν ψυχῶν δίδωσιν ὁ Θεὸς καὶ τὰς τῶ σώματι διατάξεις τε καὶ ἐνεργείας. Mich. Glyc. Annal. pars 1.

servable also, that the less perfect Animals are soonest set up; because they decline and make an end apace, therefore they begin sooner.

And that *Sagacity* which we have so often observ'd to be in Brutes (yea in the very Insects) is an Evidence that they are the Workmanship of a Wise Maker, and are guided by a Wise Director. Besides what hath been said already, we might mention how the angry *Porcupine* knows when it is his time to dart forth his Bristles to wound his Adversary; the *Ichneumon* (the Rat of *Nilus*) takes the opportunity of the Crocodile's gaping and leaps into his Mouth, and thence descends into his Belly, and so dispatches him: the *Jackal* hunts always with the Lion for part of his Prey: and withal it is observable, that this latter cannot be without the assistance of the former, for he is neither swift nor quick-scented, and therefore is happily befriended by the *Jackal*, who hath both these Properties, and so he is a fit Caterer for the other. Therefore this may be the meaning of the Psalmist, Psal. 104. 21. *The young Lions roar after their Prey, and seek their Meat from God*; they seek it and procure it in this notable way, which is by the singular Providence of God. This their natural way of getting their Food is call'd *seeking it from God*, because he hath given them this particular Instinct and Sagacity. And several other strange Expedients

and Methods which Animals use in providing their Food, making their Dens and Nests, avoiding things noxious and hurtful, and consulting their Safety and Welfare, &c. are palpable Indications of that Over-ruling Wisdom which they are acted by.

Some have lash'd out too far here, and have from this Consideration, viz. the great Sagacity of Brutes, attempted to prove that they are Rational. *Plutarch* hath a whole * Treatise in favour of this. The Pythagoreans held the same, and it was grounded on the μετεμψύχων. *Democritus*, *Empedocles*, and other Philosophers were of this Opinion, as † *Stobæus* relates. And we learn from *Sextus Empiricus* that it was asserted of old, that || no Animal is Irrational, but that they are all capable of Understanding and Science. *Porphyrus* is very warm on the same Argument, and makes it the grand Foundation of his Discourse concerning Abstinence: for therefore he saith we ought to refrain from feeding on any sort of Animals, because they are, like our selves, Rational Beings. Justice extends to them as well as to those of our own kind, or rather they are of our own kind, and therefore we must be just to them, and consequently

Q we

* Libr. πειλὶ τῶ πα ἀλογα λόγῳ χρῆσθαι. † Eclog. Phys.
|| Οὐδὲν ἐστὶ ζῶον ἀλογον, ἀλλὰ καὶ νῦ καὶ ἐπισήμης δεκτικόν ἐστὶ
παντὶ. Pyrrh. Hypot. l. 2. c. 5.

we must not take away their Lives, for killing them is Injuring them. And several other things he offers to prove this Opinion. Indeed, to give this Author his due, he saith as much for the Rationality of Brutes as can possibly be suggested. Nothing can be more Ingenious and Plausible than what he hath deliver'd, so that Brutes are for ever oblig'd to him for his Endeavours of this sort.

Nay, he and some others go further, telling us that they have not only Reason but Speech; and that as there are different Species of Brutes, so there are of Languages too, in which they understand one another. And some Philosophers of old, as *Melampus*, *Tiresias*, *Thales*, *Apollonius Tyanicus*, and *Pliny* (if *A. Gellius* saith true of him) pretended that they understood them: and *Porphyrius* was so foolish as to believe it: and * *Sextus* the Emperick had the same Thoughts. It is true, some Brutes have a way of communicating with one another, i. e. by the Noise they make they signify to one another their natural Propensions and Desires: thus *Hens* hold some vocal Correspondence with their young ones, &c. If this be all they mean by using a Language, we acknowledge it; but we cannot but add, that it is improper and absurd to call an Inarticulate Sound a Language or Speech. Nor can Brutes in general be said to have or use this, when

* Pyrrhon. Hypotyp. l. 1.

it is found but in few of them, and especially when it is only an Expression of their natural Instincts, and not of any internal Reason that they are owners of. Had there been any such thing as the Language of Brutes, we should have heard of it from the Inquisitive *Augurs* among the old Romans. If there had been any such Notion among the wisest of the Pagans, most certainly they would have made *Divinations* from this. But it appears that they had no such apprehension, and among all their ways of *Augury* (which was from what they could possibly observe in Animals) we have not a Word of this; we never read that any of their Soothsayers pretended to prognosticate from the Language of brute Beasts. Which plainly shews that this was a groundless odd Fancy of a few Men, and is no Proof of the Rationality of Beasts, which is the thing they aim at.

There were some *Jews* likewise (as well as *Pagans*) that held there is Reason and Understanding properly so call'd in Beasts. *Philo* was so deluded as to be of this Number, and *Maimonides* and some other Rabbies follow'd him. Yea, * one of the *Christian* Writers (who was a Novice in Philosophy as well as Divinity) maintains the Reasonableness of Brutes, and holds that they use a Language. And there are some *Moderns* who almost for-

Q 2

feit

* Lactantius de Ira Dei, cap. 7.

feit their Rational Nature by pleading for that of Brutes. But all Persons void of Prejudice and vain Conceit exclude these Creatures from partaking of Reason strictly so call'd, and only acknowledg a bare Semblance or Shew of it in them. Which is the very thing that the *Old Stagirite* long since asserted, * *There is, saith he, another kind of Prudence, Art and Wisdom in Brutes:* and in the same Place he calls it *an Image or Resemblance of Prudence.* As specious as it is, it is founded in these two, Memory and Sense. The quickness of both these produceth those Actions in them which have some appearance of Reason, some faint Glimmerings of Intellectual Light.

And let me add this, (which gives the true account of this matter, and is a great Argument of the Divine Prudence and Management) these Creatures are endued with this wonderful excellency of Memory and Acuteness of their Senses (insomuch that they surpass Man) because they are destitute of Reason which is Man's Prerogative. For Reason is principally in order to Religion, to the knowing and enjoying of God, and understanding the Means in order to that end. The Maker and Governour of the Universe hath wisely compensated the want of this in Brutes by bestowing on them a transcendent Sharpeness as to the other, especially the Corporeal

* Hist. Animal. l. 8. c. 3.

poreal Senses, which are more quick and apprehensive in them than in those of Humane Race. *Eagles* and some other Fowls are more quick-sighted than Men. Some sorts of *Dogs* are note for their excellent Smelling, (though any Considerate Man may see that this excellent Quality is not so much for themselves as for their Masters, for the Benefit and Advantage of their Owners) yea most Beasts have a wonderful Acuteness and Dexterity as to their Outward Senses above Men, and that because God hath bestowed some better thing upon Man, *viz.* a Rational Soul. In which respect it is said, *He teacheth us more than the Beasts of the Earth, and maketh us wiser than the Fowls of Heaven,* Job 35. 11. Therefore *Pliny* and *Plutarch*, who blame the Conduct of Nature because all Creatures are armed but Man, who comes helpless into the World, talk very unphilosophically, for they seem to forget that *Man* hath *Reason*, which is better than Horns, Shells, &c. They speak as if they were unacquainted with the Excellent and Noble Nature of this Faculty, which is far superiour to all that is in Brutes, and shews the great and singular Felicity of Man, *viz.* that it consists not in the Operations of the lower Faculties, but in the Perfections of the Rational Endowments.

It remains now that I answer an *Objection*, and then put a Period to this Part of my Under-

dertaking. It may be said, Are there not many Useless and Superfluous Animals in the World? Yea, is there not a great Number of Hurtful and Mischievous Creatures on the Earth, and in the Air, and 'tis likely in the Waters too? How can a Wise Providence be proved from the Existence of such Creatures, as *Foxes, Otters, Weefels, Pole-Cats, Rats* and *Mice*? To what purpose could *Spiders, Flies, Fleas, Lice, Wasps, Hornets, Caterpillars*; or *Owls, Kites, Vultures*; or *Frogs, Toads, Serpents, Vipers, Scorpions* be made? Doth not the Troublesome Existence of these Creatures prove rather a Carelessness in the Divine Management than a Provident Care of the World?

I answer, 1. Though we cannot reach the Final Cause of some created things, though we know not the use of them, yet it follows not thence that they are of no use. There may be Reasons that we do not know, why God made them: and there may be a Reason why those Reasons are not known to us. Some Persons will be asking a Rational Account of every thing in Nature, but nothing is more Unreasonable and Impertinent than to demand this always. If it should be asked why the *Cock* rather than any other Fowl gives warning of the Sun's appearing, and crows before it rises? a Man may make a shift to find some Answer, but I question whether

whether it would carry any solid Reason or Weight with it. If it should be demanded why the People about the *Magellanick Streights* are white, and those about the *Cape of Good Hope* are black, seeing both of them are under the same Tropick, I believe it would be difficult to give such a Solution as is satisfactory. If a Man should be ask'd why *Bays* or *Lawrel-leaves* rather than others crackle in the Fire? I do not apprehend what Answer he can return, unless he should give a witty one instead of a wise one, *viz.* that whilst other Leaves burn silently, these being the antient Rewards of *Victors*, and used in Loud Triumphs, make a Noise even in the Flames, and personate *Fame's Trumpet* when they are expiring. And a hundred more Questions might be ask'd which none can reply to with any satisfaction to himself or others. Therefore a Wise Philosopher will not pretend to save all things. This one would think might suffice in the present Case, *supposing* that there were no Reason to be assigned of God's making the foresaid Creatures: but I shall very soon let you see that there is.

It is true, if we could say of any Animal, and prove it, that it was made to no purpose, then God's Wisdom is impeached: for to make a thing to no End, Design and Purpose, is unworthy of the Wise Creator. But we can never prove that this or that Creature was

made to no end at all : for though we are ignorant of any End, yet there may be one. They may be of some use, though we are not able to assign it. Nay we are sure they were made for some use because they were made by Wisdom it self. But it is unreasonably required that All *Phænomena* should be solv'd, that we should know certainly the Design of God in every thing. We ought modestly to enquire into the particular Usefulness of things, why this or why that was made. What tho our shallow Understandings cannot guess at the Purpose and Project of Heaven? Must we therefore deny that there is any at all? This is unpardonable Folly and Presumption if it be persisted in. Therefore let us not be guilty of such Language as this, it had been better that such or such a Creature had not been made, for it is to no purpose, 'tis of no use. This is a rash Censuring of the Almighty, this is carping at the Works of God, yea this is charging God with Folly, and consequently is no other than Blasphemy.

But, 2. We know the *Uses* and *Ends* of these very Creatures against which the *Objection* lies, and therefore it is groundless and of no Force. For, 1. These Creatures aforementioned are appointed of God to be a *Foil* to the rest. When we see these troublesom and noxious Animals, we have thence occasion given us to observe and admire, to value and praise God
for

for those other parts of the Creation which are every ways so beneficial to us, and are accompanied with no Inconveniencies. We should not sufficiently Prize these, nor be sensible how serviceable they are to us, if we did not sometimes behold the others, yea and feel part of some Incommodity which goes along with them. The one are necessary to set off and commend the other : and this useful Diversity and Variety in the Creatures are for the Perfection and Harmony of the World. This is the first positive Reply to the Objection.

2. These Creatures, even those of them that are the meanest, set forth God's *Power* and *Wisdom*, and therefore are not useless. There is something very Observable in every one of these ; their Make, their Rise, their Shape, their Contrivance, their particular Instinct and Operations administer abundant matter to us, whence we may certainly infer the Reality and Truth of these two Divine Attributes ; that is, we may gather from what we see in these Creatures, that he that gave them their Being is infinitely *Powerful* and *Wise* : for there are the plain Tracks and Marks of those Divine Excellencies in them. It is a high Flight of a very Philosophical Man, The least Fly *, saith he, discovers more the Power and Wisdom of God to those that attentively

* Malebranch *Search after Truth*, book 4. chap. 7.

tentively consider it, without being prejudiced by its smallness, than all that the Astronomers know of the Heavens.

3. That Choice Attribute of God, his *Goodness*, is discover'd in these Creatures, for they are of real *Benefit* and *Advantage*, and that on several Accounts.

First, they are beneficial *to one another*, for some of these mention'd in the *Objection* are Food to others. Owls feed on Frogs, Rats and Mice, and other Vermin. Flies and Gnats and other Insects are the Chief Sustenance of some Fowls. In the Eastern Countries Serpents are commonly fed upon by Stags and Harts. And if we were at leisure to search further into Natural History, there might be more Instances produced to this purpose. Here then is a plain and direct Use of these Animals, and this use is for the Good and Advantage of their Fellow-creatures. If God makes one Creature to be Meat for another, it is so far Beneficial.

Again, these very Creatures (as mischievous as some of them are) are really *Beneficial to us*: for some parts of them are made use of in Medicks, and with good Success, as the Learnedest Physicians attest. A *Wolf* is useful in Physick, and so is an *Otter*, and so are *Mice* and *Moles*. A *Fox's* Lungs are good for Astmatics, according to *Dioscorides*, l. 2. c. 41. and his Liver is useful for the like Purpose,

pose, according to *Pliny*, l. 28. c. 13. and *Celsus*, l. 4. c. 4. The Flesh of an *Hedg-hog* is a Remedy against the Elephantiasis, *Dioscor.* l. 2. c. 2. Its Liver being dried is good against Convulsions, saith the same Writer; and he tells us that it helps the Diseases of the Reins, in the same Chapter. The Blood of a *Weefel* cures the Leprosy aforementioned, call'd Elephantiasis, *Plin.* l. 30. c. 13. It is it self effectual against Poison, *Dioscor.* l. 2. c. 27. The Ashes of it being drunk are available against the Falling-sickness, *Plin.* l. 30. c. 4. Its Blood is good against this Disease, *Dioscor.* l. 2. c. 27. The very *Dung* of several Beasts is particularly mention'd among Physicians as useful. *Toads* dried and reduced to Powder, and otherwise prepared, have a Medical Virtue. *Earth-worms* (which are reckon'd by most as a Useless sort of Creatures) are several ways made use of in Physick. They knit and strengthen the *Nerves*, *Dioscor.* l. 2. c. 72. they cure Sores and Maladies in the Ears, *Galen*, l. 3. τὰν ἡγετὰ τῶν ὄτων. They are used for the Teeth, *Plin.* l. 30. c. 3. and against the Stone, l. 30. c. 8. and several other Distempers. *Cantharides* are useful against the Jaundice, saith the Great *Hippocrates*, *Lib. de Intern. Affect.* and for other Purposes he mentions them. *Spiders* were of Virtue against Fevers, especially Tertians, *Dioscor.* l. 2. c. 68. Their Web is useful in Wounds, say

say *Dioscorides, Galen, Pliny. Millepedes* or *Hog-lice* are often commended by the same Persons for several Uses. *Ant's Eggs* are medicinal, *Plin.* l. 29. c. ult. and l. 30. c. 15. Nay, *Moths* have their use, as *Pliny* saith, l. 29. c. ult. A *Gnat* burnt to Pouder, and applied to a Scab, kills it; *Hildegard. Phys.* l. 4. I could produce a great Number of *Modern Authors* who attest the Medical Use of most of these Creatures, but I think it will not be expected here.

As for those Troublesom Insects which I mention'd last, *viz. Gnats*, this perhaps may be said with Truth, that when they sting People, and so far do them harm, they may at the same time do them a Courtesy; for tho they leave some poinant Atoms in their Flesh, yet they, it is likely, suck out, and carry away with them those that are much worse, and would have proved hurtful to their Bodies if they had not been exhausted by these disturbing Animals. I confess I never read in any Author that a *Flea* hath any medical Efficacy in it, yet there are five hundred Books written in that Faculty which I never perused, and so I am not certain but that some one of them may mention this Insect as useful in a Physical way. But suppose no such thing appears in any Writer, yet we cannot thence conclude that it is wholly Useless, because (as I said before) there may be Uses of things which we are ignorant of.

If I may conjecture, it is not improbable that both *these* and *Lice*, which are reckon'd very incommodious, (and are so) may in a very great degree be serviceable sometimes to the Body of Man. Who knows but that the former may be useful among poor People by a plentiful *Phlebotomy*, and save them the Charges of a *Lancet*, and clear them of the worst of their Blood *gratis*? And it is not unreasonable to think that both these and the latter purge some Bodies of particular ill Humours, which they suck up and live upon: These Vermine to which Human Bodies are incident, are as necessary perhaps to them at some times as some of those *Emunctories* which God hath placed there to drain off superfluous Choler, Phlegm, &c. The like we may say as to *Toads* and Serpents, Vipers, and other Poisonous Creatures in respect of the Earth. They are made to lick up the putrid and malignant Matter from it, and thereby to purge it of what might be hurtful to Fruits and Plants. This is the true reason why there are Venomous Creatures, and not that which *Pliny* assigns, *viz.* that * our Mother Earth out of Pity and Compassion towards us brings forth Poisons, that by them we may dispatch our selves out of this wretched Life with an easy Draught, without Wounds or Blood-shed. *Flies,*

* Nat. Hist. l. 2. c. 63.

Flies, of which sort of *Insects* there is such a vast number, are serviceable, I conceive, to the meliorating of the Air, for this is their Food generally, and they suck in the worst part of this Element, (as we may gather from their hanging about any thing that is putrid and corrupt) and so refine and purify it. The same is to be said of *Spiders*, and some other *Insects*. So *Ravens* and some other *Creatures* devour the Carcasses of *Beasts* that are cast into the Fields, for they feed upon *Carrion*, and therein do great Service, because by this means corrupted Bodies and all manner of Filth are taken out of the way, which otherwise would infect the Air. Thus they are of good use to the World:

This is not the common Apprehension of Men; especially if we speak of some of those *Insects* before mentioned; they are generally voted as Useless in the World, as appears from that Passage in *Plautus*,

* *Item genus est lenonium inter homines, meo quidem animo,*

*Uti musca, culices, pedesq; pulicesq;
Odio & malo, & molestia; bono usui est
nulli.*

It was thought they were to no purpose, neither could be to any that is good; but I hope the

* *Curcul. act. 4.*

the Contrary is evident from what I have said.

And it may be observed further in pursuance of what I am speaking of (*viz.* the *Advantage* that accrues to us even by the worst of Animals) that there is no Venomous Creature but carries its *Antidote* with it: it hath something which will cure the Poison it imparts. A *Scorpion's* Flesh applied to the Wound made by it, heals it. *Dioscorid. l. 2. c. 13.* Though the *Viper's* biting be poisonous, yet of it is made a most effectual Remedy to hinder its being lethal. Poison is expell'd by the Fat of *Dragons*, saith *Pliny, l. 29. c. 4.* *Galen* of old observ'd that the Wounds that are inflicted by Venomous Creatures are cured by a Powder made of their Flesh, or by some part of the Flesh applied to or rubb'd upon the part affected. *De Theriaca, cap. 11.* The Sting of the *Tarantula*, tho it is not cured by this Fly it self, yet it is by another sort of Flies, *Cantharides*. *Bapt. Port. Phyto, l. 6. c. 23.* Finally, under this Head we may observe what Naturalists have assured us of as a certain Truth, that in those Countries where there is great store of *Serpents*, there are also growing such Plants as are soveraign Remedies against their Venom: and there are more of them in those places than in any others.

Further,

Further, All those troublesome and hurtful Animals above-mention'd are beneficial to Man, because the Mischiefs they do are for his Good, *i. e.* he can make a good use of them. For hereby he hath a frequent opportunity of exercising his Patience, of arming himself with Contentment and Humble Resignation, of exerting his Fortitude and Self-denial, of allaying and moderating his inordinate Delight, and pleasing himself in the Creatures, which he is liable to. Thus the worst Animals are as serviceable and profitable as *Afflictions* and *Distresses*, which all the serious *Moralists* as well as devout *Christians* have voted to be of great and indispensable use in the Life of Man, and are Tokens even of Divine Favour and Goodness.

Besides, that some of those Creatures above-named are able to do us so much Hurt, and yet that they do so little, and so rarely, is an Argument of *Divine Goodness*. That they are afraid of us and fly from us, when we are rather thinking of flying from them, is an Evidence of that Kind and Watchful Providence which attends us. Tho God produced these Creatures, yet we see that they are powerfully restrained, and their hurtful Nature is check'd and kept in, which is a very observable but convincing Proof of the Heavenly Benignity and Mercy.

Lastly,

Lastly, God made these Creatures (as well as Man) to enjoy their Essence and Life, and therein to be partakers of his Bounty and Munificence. Whilst every thing hath the fruition of its Being, it is so far useful to it self: and this is an Argument of the Divine Indulgence, and one reason of the Production of things. *God created all things that they might have their Being; Wisd. 1. 13.* And yet this is to be understood so, that they were all made for *Man*; because he can and may one way or other make them useful to him. Thus *God's Goodness* is seen even in those Animals which on some account are not good.

4. They set forth *God's Justice*, and for that reason are serviceable in the World. He is pleased to make use of them sometimes in the way of Punishment. Thus *Lice* and *Flies* were produced on purpose to plague the Egyptians, *Exod. 8. 16, 20.* * *Aristotle* mentions the Names of some that were kill'd with Lice bred in their Bodies. So *Sylla* one of the Roman Dictators perished by the *Phthiriasis*, saith † *Plutarch*: and so died *Philip* the second, King of *Spain*, if we may credit very good Historians, and the elder *Vossius* among the rest. Some to whom Lice prov'd mortal are reckon'd up by ‖ *Aldrovandus*. *Hornets* and *Wasps* were dispatch'd by the Divine Avenger to expel the *Canaanites*, *Exod. 23. 28.*

R

Jos.

* Hist. Animal. l. 5. c. 31. † In Sylla. ‖ De Insect. l. 5.

Jos. 24. 12. Wisd. 12. 8. Locusts, Caterpillars, Canker-worms, Palmer-worms, are threatned and inflicted as Judgments on the disobedient Israelites, *Joel 1. 4. 1 Kings 8. 37. Psal. 78. 46. & 105. 34.* What Mischief *Locusts* did in some parts of *Italy*, * *Livy* and † *Pliny* relate. The Pestilence and Mortality which they caused by their stink in several parts of *Africa* is particularly set down by || *Orosius*, *Paulus Diaconus*, and others. And Modern Historians testify how mischievous they have been in *Dacia, Pannonia, &c.* *Herod the Great* (as *Josephus* relates) and *Herod Agrippa* (as *St. Luke* informs us) were devour'd by *Worms* or *Maggots*. And this was partly the loathsome fate of *Antiochus* (as we read in *2 Mac. 9. 9.*) and of *Maximinus* (of whom *Eusebius* speaks, *Eccl. Hist. l. 8. c. 28.*) for their Bowels being rotted and eaten with *Worms*, they became a Torment to themselves, and a Plague to others by reason of the intolerable Stench which proceeded from their putrified Bodies. And other Examples of such as were eaten up of this Vermin you may see in *Aldrovandus, de Insectis, l. 6.* The Inhabitants of the Isles of the *Cyclades*, and the People of *Troas*, were banish'd their Country by *Mice*, they covering the places with such Multitudes. *Plin. l. 8. c. 29.* and *lib. 10. c. 65.* *Justin* reports the same of the *Abderites*: *Hist. l. 15.* And other Instances

* *Lib. 42.* † *Lib. 11. c. 29.* || *Lib. 3. c. 16.*

Instances might be offered to prove that God makes use of fundry Kinds of Living Creatures to plague notorious Offenders. He therefore that complains of the Existence of these in the World, complains that God hath ways and means of Punishing the wicked when he pleases. And be the Creatures never so hurtful, there is no reason for this Complaint; for the more Harmful any one of them is, the more useful it is to the Purposes of Divine Vengeance.

But then we must remember that *we* occasion this, yea that at first we pull'd down a *Curse* upon the Creatures by our Primitive Apostacy from God. We rebell'd against Heaven, and it is no wonder that they do so against us. We affronted the Sovereign Majesty, and therefore we justly meet with some that take His Cause, and revenge it. In short, whatever noxious Qualities are now discern'd in any of the Creatures, they proceed not from God, but the Sin of Man, whereby they are corrupted. *We* have changed the Nature of them, we made them hurtful, and therefore we have no reason to complain. But it is our Duty to accept of the Penalty of our Delinquencies, and to make it useful (as we well may) to Repentance, and our Turning unto God. We may conclude then from all that hath been said, that God made none of the Creatures in vain, but destined every one of

R 2

them

them to some use. We may give our Suffrage to that Saying of the Jews, *There is nothing in the nature of things of which there may not be assigned a reason why it was created.*

It appears from what hath been suggested, that even *Insects*, which are the imperfecter sort of Animals, and may seem to be the most useless of any, are for Purposes of a considerable nature. And it is to me very evident that God would not have made such *Variety* of them (as about * sixty kinds of *Flies*, forty sorts of *Beetles*, five and twenty several kinds of *Spiders*, fifty different Classes of *Canker* or *Palmer-worms*, an hundred sorts of *Butterflies*) unless they were good for something. And 'tis observ'd by those that write concerning this particular Rank of Creatures, that all *Vegetables* whatsoever, nay all *Animals* both alive and dead produce their peculiar Species of them: (but how this is consistent with that late Notion which some Learned Virtuoso's have broach'd, *viz.* that there is no such thing in Nature as *Spontaneous* or *Equivocal Generation*, I will not now dispute: only I will here offer my Opinion, *viz.* that *Insects* are produced both ways, by equivocal as well as univocal Generation; for I observe that the Divine Author of Nature is pleased to act *differently* and *variously*) and moreover they are different according to the diversity of Place and Country

* Aldrovand. de Insect. Dr. Lister in Hist. Animal.

try where they are bred. Nay, that there may be a more speedy and plentiful Procreation of them, they are generally *Hermaphrodites*, and sustain the part of both Sexes, as the Worthy Mr. Ray hath observ'd. Wherefore I question not but they are some way or other Useful, for we must not think that these Beings are Multiplied in vain. And if we enlarge the Horizon, and look upon Nature in her several Provinces and Dominions, whether Animate or Inanimate, whether in the Heavens, Air, Earth, or Sea, whether mineral, vegetative, or sensitive; if we survey the World and All the Works of the Creation, we shall find that they were made for excellent Ends. In the close of every Day's Creation that was the general *Epiphonema*, *God saw that it was good*. And as this was said of every particular Day's Work, so at last there is the like Approbation and Allowance of the whole Frame of Beings, * *God saw every thing that he had made: and behold, it was very good*; Good as it answer'd to the Divine Idea, and the Will of the Creator: Good also, as it was destined to the Use and Service of Man. All created Beings have a *Goodness*, not only that which is Metaphysical, viz. in respect of their Being and Nature intrinsically, but extrinsically and relatively as they are useful to Mankind some way or other. Even those Creatures that are harmful

* Gen. 1. 31.

ful are really good for some Ends, as we know and experience. And there may be a Goodness in some of the Creatures which as yet we do not see, but afterwards may display it self, and future Ages may have the happiness to make these Discoveries, though the past and present ones enjoy the Good, but know it not. To shut up all; no one part of the Creation is superfluous and unprofitable: every thing hath its proper Goodness. That is, in other terms, the Whole World is full of God and of his Providence. And yet I have not yet spoken of *Man*, the Top of all the Visible Creation, in whom the Wonders of God's Care and Providence are chiefly manifested. But of Him I will distinctly and professedly speak in my next Essay.

C H A P. XII.

This Argument which hath been used all along in this Discourse to prove a Deity and Providence, was made use of in the Old Testament by Job, and by David in several of his Divine Hymns, (which are distinctly commented upon): by St. Paul in the New Testament, by the Christian Writers of the succeeding Ages, by Pagan Philosophers and Poets, whose memorable Testimonies are cited. The Proper Inferences from the whole are these:

1. We

1. *We are obliged to own a Deity in the visible Works of the Creation.* 2. *We have hence Incouragement to contemplate the Creatures, and to study the Works of Nature.* 3. *By this Contemplation and Study we should be induced not only to acknowledg, but to worship, love and obey the Omnipotent Creator, and to devote our whole Lives to his Service and Honour.*

BUT before I enter upon that, let us seriously weigh the Worthiness of this Subject which I have been insisting upon, and let us attend to the Proper Inferences which may be made from it. That the matter of this Discourse may not seem to be unworthy of the Reader's serious Thoughts, I desire him to consider that this is the Argument which is used in the *Holy Scriptures* to prove a God, and to convince Men of his glorious Perfections. To begin with the Writings of the Old Testament, *Job* argues from the frame of the World and all the Creatures that are in it, *Ask now the Beasts, and they shall teach thee: and the Fowls of the Air, and they shall tell thee. Or speak to the Earth, and it shall teach thee; and the Fishes of the Sea shall declare unto thee. Who knoweth not in all these that the Hand of the Lord hath wrought this? In whose Hand is the Soul of every living thing.* The latter part of the 36th Chapter of *Job*,
R 4 and

and the 37th, 38th and 39th Chapters throughout treat of the Works of the Creation, and thereby designedly evince the unlimited Power and unsearchable Wisdom of the Almighty.

How frequent is *David* on this Theme, extolling God's Providence in respect of the Creatures, the Heavens and Earth, Living and Inanimate things? He speaks like a true Religious Philosopher in the beginning of the 19th Psalm, *The Heavens*, saith he, *declare the Glory of God, and the Firmament sheweth his handy Work*; v. 1. He speaks of these inanimate things here, and in other places, as if they were endued with Sense, Reason and Speech, and could really *declare* and *shew* God's Power and Glory; but the meaning is, that they occasion others, who are endued with those Faculties, to declare and set forth the Divine Praises. And hence the *Heavens* (of which he particularly speaks here) are call'd *the Ministers of God's Word* by some of the Antient * Fathers. And it might be observ'd that *Shemesb*, *Sol*, is as much as *Minister*, it being derived from the Chaldee *Shamash*, ministravit. *Day unto Day uttereth Speech, and Night unto Night sheweth Knowledge*, ver. 2. i. e. the Vicissitude of Days and Nights made by the motion of the Heavens declares God's Providence, and instructs Men in the Knowledge of the Creator. *There is no Speech nor Language*

* Tertullian, Origen, Justin Martyr, Augustine.

guage where their Voice is not heard, v. 3. i. e. though these Heavenly Bodies be speechless, though they silently roll about, and make no Noise, yet they may truly be said to have a Voice, and there is no Nation or People in the World that do not hear it, and loudly proclaim the Power and Wisdom of God. For (as he adds) *Their Lane is gone out through all the World, and their Words to the end of the World.* In them hath he set a Tabernacle for the Sun, which is as a Bridegroom, &c. His going forth is from the end of the Heavens, &c. ver. 4, 5, 6. i. e. in the midst of the Firmament is placed the Royal Mansion of the Sun, who sets forth at one extreme Point of the Heavens, and passeth through all Parts till he comes back to the same Point again, and so visits all Climates of the Earth: the remotest Countries under Heaven are sensible of the Virtue and Influence of his Universal Progress. And then the Psalmist passes from the Consideration of the *Heavens* to the *Word of God*. After he had spoken of *the Book of Nature* he proceeds to that of the *Law*, thereby acquainting us that both set forth God's Glory: the Beauty and Uniformity of the World (and particularly of the *Heavenly Bodies*) as well as the Written Word, give us an assurance of his Infinite Perfections and Excellencies.

Again, in *Psal. 95.* he is proved to be a Great God, and a great King above all the reputed

puted Gods of the Heathens, because *in his Hands are the deep places of the Earth: the Strength of the Hills is his also. The Sea is his, and he made it, and his Hands formed the dry Land; v. 3, 4, 5. i. e.* the Fabrick of the World, all the admired Treasures of Heaven and Earth, of Sea and Land, are unquestionable Testimonies of his Godhead. The Psalmist doth not think (whatever some fancy) that the present State of the Earth, Sea and Heavens is deformed and disordered: he praises and admires God in the Contemplation of them. The whole 104th Psalm is an Elegant Account of the Works of the Creation and of *Providence*, for indeed it is impossible to separate these two: all things that we see in the World prove not only the Being of a God, but that he Rules them with Wisdom and Goodness. And this you may observe here, that this Divine Poet reckons up these Works of God according to the *Mosaick Method, i. e.* in that order in which *Moses* represents them to have been produced at first by God when he made the World. He first mentions *Light*, which was the Product of the first day, *v. 2.* then the *Heavens* and *Firmament*, and the *Angels* (the Inhabitants of those upper Regions of the World) *ver. 2, 3, 4.* which were created on the second day: then the *Earth, Sea, Springs and Rivers, Plants, Grass, Herbs and Trees*, the third day's Work, *v. 5. &c.*

after

after that the *Sun* and *Moon*, v. 19. which were made on the fourth day; and the *Fishes of the Sea*, which are the fifth day's Production, v. 25, 26. with which he concludes, having supposed the Creatures of the Last day's Work in what he had said before. The Sum of all his Philosophical and Religious Contemplations in this Excellent Hymn, is comprised in those words, *O Lord, how manifold are thy Works! In Wisdom hast thou made them all.* He first acknowledges, and at the same time admires the Wonderful Variety of the Works of the Creation; and thence he rationally infers and declares that an Understanding and Wise Being was the Author of them. From the serious Consideration of the Visible World his Mind devoutly, but naturally, rises to a sense of the First and Supreme Cause of it.

In the 148th Psalm the same devout Poet extols God from the particular Consideration of the Creatures of all ranks and sorts, first those in Heaven, the *Angels*, the *Sun*, *Moon*, *Stars* and *Light*, v. 2, 3. 2dly, those that belong to the Waters, *Dragons* (which is a word that here denotes all great *Fishes*) and all deeps wherein they dwell, v. 7. 3dly, those in the Air, as the *Meteors*, viz. *Fire* (i. e. *Thunder* and *Lightning*) *Hail*, *Snow*, *Vapour*, *stormy Winds*, v. 8. 4thly, on the Earth, viz. 1. Those that are Inanimate, as *Mountains*, *Hills*, *fruitful Trees*, and *Timber-trees*, among which the

the *Cedar* is chief, and doth here represent all the rest, *v. 9.* 2. *Living Creatures*, and first those that are Irrational, wild *Beasts*, and all *Cattle*, *creeping things* and *flying Fowl*, *v. 10.* Secondly, Rational, Mankind of what degree soever, *Kings and all People*, (*i. e.* their Subjects.) *Princes*, *Judges*, *young and old* of both *Sexes*. In the *135th Psalm*, *v. 5, 6, 7.* the same Subject, but more briefly, is treated of: and in *Psal. 136. v. 5, 6, 7, 8, 9.* he gives a compendious but excellent Description of this Mundane System, and of the Universal Furniture of it, and thence excites Men to adore and magnify the Wise Creator of all. And interspersedly in several other Psalms (some of which I have had occasion to mention before) he falls upon this Excellent Theme, and admirably improves it to the purpose aforesaid.

If we pass to the *New Testament*, we shall there also find this Argument used. From the Fabrick of the World *St. Paul* proves to the Men of *Lystra*, that there is a God, a *Living God*, in Contradistinction to the Gentile Gods, or Idols rather. From the making of *Heaven and Earth*, the *Sea* and all things that are therein, he argues the Existence of an All-sufficient and Self-subsistent Being, *Acts 14. 15.* And again, *Rom. 1. 20.* *The invisible things of God from (i. e. ever since) the Creation of the World are clearly seen, being understood by the things that*

that are made, even his eternal Power and Godhead, even those Invisible things are clearly manifested by those Visible Works that he hath wrought. Or perhaps the meaning of ἀπὸ κτιστέων may be from the Consideration of the Creation, from this alone the invisible things of the Deity, viz. his Power, Wisdom and Bounty are seen and proved.

This way of proving the Divinity by the Works that are seen, is used by *Fathers* and *Philosophers*, by *Christians* and *Gentiles*, by *Sacred* and *Prophane Writers*. * This World, saith a Greek Father, is the School of Rational Minds, and the Nursery of that Knowledge which we have of a God. † Our own Make, and that of the World wherein we live, are Testimonies of a Deity, saith *Tertullian*. *Basil the Great*, *Gregory Nazianzen* and *Ambrose* have written on the *Six Days Works*, and have with a mighty Fluency of Style pursued this Argument. *Athanasius* in his *Book against the Gentiles* very closely and solidly manges this sensible Proof of a Deity. *Cyprian* discourses after this rate, || that “ the Times and Seasons of the Year, and the several

* Τῶν ὑγῶν λογικῶν διδασκαλεῖον, καὶ τῆς θεογνωσίας παρρησιάζειον. † Habet Deus testimonia totum hoc quod sumus, & in quo sumus. Cont. Marcion. l. i. c. 10. || Videmus Dei munera tempora obsequi, elementa famulari, spirare ventos, fontes fluere, grandescere copias messium, fructus miscere vinearum, exuberare pomis arbuta, &c.

puted Gods of the Heathens, because *in his Hands are the deep places of the Earth: the Strength of the Hills is his also. The Sea is his, and he made it, and his Hands formed the dry Land; v. 3, 4, 5. i. e.* the Fabrick of the World, all the admired Treasures of Heaven and Earth, of Sea and Land, are unquestionable Testimonies of his Godhead. The Psalmist doth not think (whatever some fancy) that the present State of the Earth, Sea and Heavens is deformed and disordered: he praises and admires God in the Contemplation of them. The whole 104th Psalm is an Elegant Account of the Works of the Creation and of *Providence*, for indeed it is impossible to separate these two: all things that we see in the World prove not only the Being of a God, but that he Rules them with Wisdom and Goodness. And this you may observe here, that this Divine Poet reckons up these Works of God according to the *Mosaick Method, i. e.* in that order in which *Moses* represents them to have been produced at first by God when he made the World. He first mentions *Light*, which was the Product of the first day, *v. 2.* then the *Heavens* and *Firmament*, and the *Angels* (the Inhabitants of those upper Regions of the World) *ver. 2, 3, 4.* which were created on the second day: then the *Earth, Sea, Springs and Rivers, Plants, Grass, Herbs and Trees*, the third day's Work, *v. 5, &c.*
after

after that the *Sun* and *Moon*, v. 19. which were made on the fourth day; and the *Fishes of the Sea*, which are the fifth day's Production, v. 25, 26. with which he concludes, having supposed the Creatures of the Last day's Work in what he had said before. The Sum of all his Philosophical and Religious Contemplations in this Excellent Hymn, is comprised in those words, *O Lord, how manifold are thy Works! In Wisdom hast thou made them all.* He first acknowledges, and at the same time admires the Wonderful Variety of the Works of the Creation; and thence he rationally infers and declares that an Understanding and Wise Being was the Author of them. From the serious Consideration of the Visible World his Mind devoutly, but naturally, rises to a sense of the First and Supreme Cause of it.

In the 148th Psalm the same devout Poet extols God from the particular Consideration of the Creatures of all ranks and sorts, first those in Heaven, the *Angels*, the *Sun*, *Moon*, *Stars* and *Light*, v. 2, 3. 2dly, those that belong to the Waters, *Dragons* (which is a word that here denotes all great *Fishes*) and all deeps wherein they dwell, v. 7. 3dly, those in the Air, as the *Meteors*, viz. *Fire* (i. e. Thunder and Lightning) *Hail*, *Snow*, *Vapour*, *stormy Winds*, v. 8. 4thly, on the Earth, viz. 1. Those that are Inanimate, as *Mountains*, *Hills*, *fruitful Trees*, and *Timber-trees*, among which the

the *Cedar* is chief, and doth here represent all the rest, *v. 9.* 2. *Living Creatures*, and first those that are Irrational, wild *Beasts*, and all *Cattle*, *creeping things* and *flying Fowl*, *v. 10.* Secondly, Rational, Mankind of what degree soever, *Kings and all People*, (*i. e.* their Subjects) *Princes*, *Judges*, young and old of both Sexes. In the *135th Psalm*, *v. 5, 6, 7.* the same Subject, but more briefly, is treated of: and in *Psal. 136. v. 5, 6, 7, 8, 9.* he gives a compendious but excellent Description of this Mundane System, and of the Universal Furniture of it, and thence excites Men to adore and magnify the Wise Creator of all. And interspersedly in several other Psalms (some of which I have had occasion to mention before) he falls upon this Excellent Theme, and admirably improves it to the purpose aforesaid.

If we pass to the *New Testament*, we shall there also find this Argument used. From the Fabrick of the World *St. Paul* proves to the Men of *Lystra*, that there is a God, a *Living God*, in Contradistinction to the Gentile Gods, or Idols rather. From the making of *Heaven and Earth, the Sea and all things that are therein*, he argues the Existence of an All-sufficient and Self-subsistent Being, *Acts 14. 15.* And again, *Rom. 1. 20.* *The invisible things of God from (i. e. ever since) the Creation of the World are clearly seen, being understood by the things that*

that are made, even his eternal Power and Godhead, even those Invisible things are clearly manifested by those Visible Works that he hath wrought. Or perhaps the meaning of ἀπὸ κτιστέων may be from the Consideration of the Creation, from this alone the invisible things of the Deity, viz. his Power, Wisdom and Bounty are seen and proved.

This way of proving the Divinity by the Works that are seen, is used by *Fathers* and *Philosophers*, by *Christians* and *Gentiles*, by *Sacred* and *Prophane Writers*. * This World, saith a Greek Father, is the School of Rational Minds, and the Nursery of that Knowledge which we have of a God. † Our own Make, and that of the World wherein we live, are Testimonies of a Deity, saith *Tertullian*. *Basil the Great*, *Gregory Nazianzen* and *Ambrose* have written on the *Six Days Works*, and have with a mighty Fluency of Style pursued this Argument. *Athanasius* in his *Book against the Gentiles* very closely and solidly manges this sensible Proof of a Deity. *Cyprian* discourses after this rate, || that “ the Times and Seasons of the Year, and the several

* Τῶν ψυχῶν λογικῶν διδασκαλεῖον, καὶ τῆς θεογονίας παρ-
 δευτήριον. † Habet Deus testimonia totum hoc quod sumus,
 & in quo sumus. Cont. Marcion. l. i. c. 10. || Videmus Dei
 anni tempora obsequi, elementa famulari, spirare ventos, fon-
 tes fluere, grandescere copias messium, fructus miscere vinea-
 rum, exuberare pomis arbuta, &c.

“ ral Elements are obsequious and serviceable
 “ to Mankind; that the Winds blow, the
 “ Springs and Fountains flow, the Corn and
 “ the Vines come to maturity, and there is
 “ a Plenty of all other Fruits on the Earth
 “ from the disposal of God: wherefore his
 “ Existence is not to be doubted of by any ra-
 “ tional Person, yea by any one that hath
 the use of his Senses. * *Theodoret* hath
 well demonstrated the Providence of God
 from the Consideration of the several Parts
 of the World. *Octavius* in *Minutius Felix*
 hath a short, but a very Witty and Elegant
 Oration, to prove a God and Providence from
 the Make and Order of the upper and lower
 World: Among the Moderns I will mention
 only our Divine Mr. *Herbert* in his Poem, to
 which he gives the Title of *Providence*,
 where he excellently displayeth the Wisdom
 of God in the Works of the Creation, in the
 several particular Beings which are the Pro-
 duct of it. It is an Admirable and Choice
 Piece of Divine Rapture.

The wisest Heads among the *Gentiles* as
 well as among *Christians*, have prosecuted this
 Theme, and have thought it to be of great
 force. Much after the rate of the Great
 Apostle who tells us, *God left not himself with-*
out witness, you may hear an Antient Philo-
 sopher

* Orat. 1 & 2 de Providentia.

sopher speak, * *It was fit (saith he) that God's Works should witness concerning him: thus the Sun, Night and Day, the Air, the whole Earth are Witnesses: yea all the World bears Testimony to Him.* And a Noble Platonist hath in most select and excellent Words thus characterized the Divine Being, "† He who hath disposed the Heavens into their admirable Order and Harmony, who guides the Chariots of the Sun and Moon, who is the Master of the Celestial Quire, and by his Voice and Beck keeps time, that the Music of the Stars be true, and those swift Bodies keep their Rounds exactly: he who is the great Arbiter and Disposer of the Seasons of the Year, who is the prudent Dispenser of the Winds, and brings them out of their Treasures when he please; he who shaped the vast Sea, and formed the Spacious Earth, and furnish'd it with Rivers: he who nourishes and ripens the Fruits, and stocks the World with living Creatures. Tully in his *second Book of Divination*, proves a Sovereign Cause of all things from the admirable and exquisite Composure of the World.

* Ἔργα δὲ μαρτυρεῖν, οἷα ἡλίος, νύξ αὐτῷ καὶ ἡμέρα μαρτυροῦσιν, αὐτὰ αὐτῷ μαρτυρεῖ, γῆ δὲ καὶ ἀέρας μαρτυρεῖ, &c. Heraclit. † Τὸν ἕραν ἄρμοςήν, τὸν ἡλίον, καὶ σελήνης ἀγχιγία, τὸν κορυφαῖον τῆς γῆς ἀστέρας περιφορὰς καὶ διακρίσεως καὶ χορείας καὶ δρόμου, τὸν γῆς ὕδατος ταμίαν, τὸν πνευμάτων οἰκονόμον, τὸν ποιητὴν τῆς θαλάττης, τὸν δημιουργὸν γῆς, τὸν ποταμῶν χορηγόν, τὸν καρπῶν τροφία, τὸν ζώων γενέτην. Max. Tyr. Dissertat. 25.

World. * The Beauty of this, saith he, and the Order of the Heavenly Bodies, do even force us to acknowledg that there is an Excellent and Eternal Nature, and that this is to be admired and adored by Mankind! “ † Whence
 “ comes it to pass, saith *Seneca*, that there
 “ is such a Multitude of Grateful Objects
 “ in the Universe, which ravish our Ears,
 “ Eyes and Minds? Whence is there such an
 “ Abundance of things made as ’twere to
 “ support our Luxury? for ’tis evident that
 “ there is Provision made not only for our
 “ Necessities, but we are indulged even to
 “ Delight and Pleasures. This is from the
 “ Riches of the Divine Being, and the over-
 “ flowing Bounty of his Excellent Nature.
 I will conclude with that of the Poet,

|| — *Cùm dispositi quassissem fœdera mundi,
 Præscriptosq; mari fines, anniq; meatus,
 Et lucis noctisq; vices, tunc omnia rebar
 Consilio firmata Dei.* —

When I had search'd into the World's
 Great Frame,
 And Nature's Leagues and Combinations
 seen,

How

* Esse præstantem aliquam æternamq; naturam, & eam suspi-
 ciendam adorandamq; hominum generi, pulchritudo mundi or-
 doq; rerum coelestium cogit confiteri. † Unde hæc innume-
 rabilia oculos, aures, & animam mulcentia? unde illa luxuriam
 quoq; instruens copia? neq; n. necessitatibus tantammodo in-
 firis provisum est; usq; in delicias animar; &c. ||

How the Vast Ocean's bounded, how the
Year

Runs its perpetual Course, how Night and
Day

Succeed each other, then I rightly judg'd
That these and Nature's universal Laws
Were fix'd by Counsel and a Cause Divine.

Thus you see what *Reason*, *Scripture*, and
the *Sentiments of the Wise* agree in, viz. that
what we behold in the World is a Proof of
a Deity and Providence.

Let us now seriously attend to all these,
and thence gather what is our Proper Duty
and Concern on this Occasion.

1. Let us *Acknowledg* this Great Truth, that
the World is the Product of a Divine Mind,
and that all the Ranks of the Visible Crea-
tion owe their Being to this. *Plutarch* saith
rightly that * Men had first of all the No-
tion of a God from the Beauty of the things
that are seen in the World. But the Pagans
went too far here, and their Contemplations
of the World ended at last in their owning
it to be a God. † It is meet, saith *Pliny*,
we should believe the World to be an Eter-
S nal

* Εχον δὲ ἔννοιαν τῆς πρῶτης μὲν ἀπὸ τῆς καλλυεῖς τῆς ἐμ-
φαννομένης προσλαμβάνοντες. De Plac. Philos. l. i. c. 6. † Nu-
men esse Mundum credi par est æternum, immensum, neq; ge-
nitum, neq; interitum unquam. Nat. Hist. l. 2. c. 1.

nal and Immense Numen, that had no Beginning, and shall have no End. This strange Creed of theirs was the Foundation of Idolatry, *i. e.* of worshipping the Creatures. It gives an account of the *Egyptians* and others paying Reverence to mean and sordid Animals,

* *Vilia cur magnos aequant animalia Divos.*

The Stoicks indeed † held the *World* was *God*, but they were too wise to understand it in the gross Sense: their meaning was that a Divine Spirit or Mind pervades this World, and actuates all its Parts, and preserves it in Being and Operation. This is the sense of *Cato's* Word in *Lucan*, *Jupiter est quodcunq; vides.* Which is of the same Import with — *Jovis omnia plena*: all things are replenish'd with the Divine Influence, every Creature owes its Subsistence, as it doth its Being and Original, to God. Which is that very Truth I am now reminding you of, and is every ways so reasonable and accountable. You may see God in the things he hath made. The Impress of Divinity is stamped on the Creatures, as Princes put their Effigies on their Coins.

* *Statius.* † *Totum hoc quo continemur, & unum est, Deus.* *Sen. Epist. 92.* *Vis Deum Mundum vocare? non falleris ipse enim est totum quod vides.* *Idem, Quæst. Nat. cap. 45.*

We find the Idea of God, *i. e.* Infinite Goodness and Wisdom reflected from the visible Objects of Nature. This I question not was the true Meaning and Intention of *Plato* when he held the *World* was * a *Living Creature*, and that every thing in it is *Animated*. I deny not that his Followers (if they may be call'd so) took the *World* to be a real Animal; but as for the Old Gentleman himself, I am perswaded that by the *Soul of the World* he would have us understand the Order and Harmony of it, as he plainly shews in his *Timæus*. Its Parts are as orderly and its Motions are as regular and proportionable as if it were inspired with Life, yea as if it were some Intellectual Animal. This exact Order and Regularity it received from that Eternal Mind who gave it its Existence. God may truly be call'd the Soul of the World. Him let us acknowledge to be the Author of this Beautiful Universe: whilst some deluded *Epicureans* or *Platonists* date its Being and Form from *Chance* or *Necessity*, let us (with one of the Antientest Philosophers we read of) confess that * the Fabrick of the World is most Beautiful because 'tis God's Voluntary Workmanship.

2. Be invited hence to *Study the Works of Nature*, to contemplate the Creatures, to meditate on the Works of the Lord, and the

S 2

Ope-

* In *Timæo*. † Καλλιστον κοσμος ποτ' εστιν γεθ. *Diog.*
Laert. in *Thalete*.

Operation of his Hands. The great God is set before our Eyes in the World, and may be seen and taken notice of in every Creature, like the Picture or Statue of some Founder of a College set up in some eminent and noted Place for all the Society to behold it. God hath copied forth himself in the Creation. The Creatures are so many Glasses wherein the Divine Glory is reflected, wherein the Image of God is represented. Think it then a noble and divine Work to be employ'd in the Contemplation of these. You that have time and leisure and helps proportionable, set some time apart for this Study. Take a Survey of this huge Pile of the World, consider well the Various Parts of it, scan its Excellent Structure. View first the Lower Rooms of this Habitation, this Spacious Earth, which God hath given to the Sons of Men, with all the Excellent Furniture belonging to it, the different Sorts of Vegetables and Animals it is provided with. Let your Thoughts descend into the Subterraneous Mines and Treasures of inestimable Value. Go down into the Deep Seas, and there be astonish'd with the multiplied Wonders of that Place. Then return again, and mount the Upper Stories of this Divine Habitation: Entertain your selves with the Wonders of the Aerial and Ethereal Regions, converse with those Immense Globes of Light and Fire

Fire which adorn that part of the Universe.

Exercise your Thoughts with these and the other Excellencies which this vast Fabrick of the *World* will exhibit to you: which had its Name given it by the *Greeks* from its *Ornate* Figure and *Comely* Make. *Pythagoras* is said to be the first that gave that Denomination of $\kappa\omicron\sigma\mu\omicron$ to this Great Frame of Heaven and Earth, as *Laertius* and *Plutarch* tell us: and the latter of these adds that it was stiled so $\epsilon\kappa\ \tau\eta\varsigma\ \epsilon\upsilon\ \alpha\upsilon\tau\omicron\varsigma\ \tau\acute{\alpha}\xi\epsilon\omega\varsigma$, from the Order which is in it. And the *Latins* gave it the Title of *Mundus* upon the like account, *viz.* from its *Neatness*, *Elegancy* and *Beauty*. This may allure us to the Study of Natural Philosophy, and a Survey of the Structure of the World. For here we shall certainly meet with perfect Order and Ornament, even such as will conduct our Thoughts to the Divine Author of them. If *this* be not the effect of our Studies and Enquiries, they are all in vain: for the knowing of the Works of Nature, and being able to count them, are not True Philosophy, unless we gather a God from them. Else *John Tradeskan* would have been the best Philosopher in his time; and any Man that can shew the *Rarities* at *Gresham College* would be as Good a *Virtuoso* as any of the *Fellows* of the *Royal Society*. We must not think it enough to be acquainted

with the Works of the Creation: we must advance yet higher. Our Skill in Natural History must lead us to Theology: by studying the Composition and Oeconomy of the World, which bears upon it all the Characters of Divine Power, Wisdom and Goodness, we ought to be acquainted with God Himself, to whom alone these Attributes originally belong.

And none ought to be discouraged here, for All Persons, of what Rank or Quality soever, are in some measure concern'd in this Employment, and may manage it with Success. This should be an Universal Work; nor indeed need they to be any *Great Philosophers* to do this. There is not much curious Knowledg and Observation required in the more General Discharge of this Duty. Do but look abroad, and see what is before you, and if you have honest and sincere Minds, and affectionate Thoughts, you will make a good use of what you see, because you will presently behold God in the Creatures. For the whole World is God's Image: and therefore in its beautiful Proportions, in its admirable Composure you will soon discern his Resemblance. You will behold the invisible things of God in the visible and outward Shape of the World. You will with ease find that there is that in the Creation which could proceed from none but

but an Eternal and Infinite Spirit, from one that is Omnipotent and Omniscient. Be conversant then in this Great Library, be Students in this Book of Nature, which even he that runs may read: for the Character is very plain and legible, and the Contents of this Large Volume are easily understood. Read the Godhead in the Sun, Moon and Stars, in the Air, Earth and Sea, but especially in the Creatures of the Animal Kingdom, which are endued with Sense and Life: these are all written in Capital Letters. The Devout St. *Anthony* (in Ecclesiastical Story) was well vers'd in this Great Volume, though he was never guilty of any other Learning: he used to say to the Philosophers, *This is my Book and Body of Philosophy which I read*, viz. the Works which God hath made: *here I can read the Will of God and the Words of Heaven*. Such Scholars you may all be, and that without any great Labour and Study, for the Book is always before you, and wide open, and you may be always reading in it. And though these things are neglected and despised because they are Common, (as * *Philo* observ'd) yet know that they are of themselves Admirable, and worthy of your continual Thoughts, and they will be of great use to you. Be convinced of this that 'tis not below

* Ταῦτα μὲν πρὸς ἀλήθειαν ὄντα θαυμάσια καταπεφρόνηται
τῷ συνήθει. De Vir. Mos.

a *Christian* Man to observe and meditate upon the Works of Nature. The *New Creature* doth not destroy the *Old*, or make it useless. Whilest you search into the Works of God you will find God himself, and you will acknowledg the infinite Understanding and Wisdom of the Maker of all things. For he *hath made the Earth by his Power, he hath establish'd the World by his Wisdom, and hath stretched out the Heavens by his Discretion,* Jer. 10. 12.

3. and lastly, By acknowledging this Substantial Truth which I have been treating of, and by contemplating the upper and the lower World, let us be brought to *glorify* the Omnipotent Architect, to *praise* and *worship* him, to *fear* and *serve* him, and to *dedicate our whole Lives* to him. If the Heavens declare the Glory of God, if those Celestial Lamps shew by their Light their Maker's Beauty, and set forth his more Resplendent Glory, of which the Sun and Brightest Stars are but Shadows; yea if the meanest and most obscure Creatures do in their Kind and Measure celebrate his Praises, if a Gnat or a Fly declare the Power and Wisdom of their Maker, if even inanimate Creatures sing *Te Deum* to him, then how much more are we obliged to praise and glorify him who have this Example before us, and for whose sake all these things were made? If all things
every

every where be full of the Deity, let not our Mouths be empty of his Praises. That the World is a *Temple*, was the Acknowledgment of the Pagans. *Mundi magnum & versatile templum*, was *Lucretius's* Language, though he was an Atheist. But *Plutarch* goes further, and tells us that this World is a *most Holy and Divine Temple*. Let us then dedicate it to God's Service, and let us sing Praises to him in his own Temple. Let us worship him in his *Own House*, as * *Philo* calls this *World*. Let us perpetually extol the Builder of it for the regular Frame, excellent Beauty and wise Ordering of it.

And let us not only with our Tongues (which are our *Glory*) laud and magnify this Divine Founder, but let us with all Reverence Serve and Obey him, and be zealous of performing all Homage to him in our Lives. All Creatures in their kind render some Service to him, every thing pays him Tribute: the Sun with its officious Heat and Light, the Moon and Stars with their proper Influences: the teeming Earth with all its Plants, Flowers, Fruits and Animals, with all the Treasures that lie lock'd up in its Bowels: the Water, the Air, the Fire, Heat and Cold, Summer and Winter do all obey him. Let
not

* Ὁ αἰδητὸς ἐπὶ κόσμῳ ἔδιν ἀρα ἄλλα ἐστὶ ἢ δίκῃ θεῷ.

not *Man* then only be defective in his Duty, *Man* who hath Skill to use all these things unto rational and artificial Ends, which no other Creature can do. Let him be brought by his Contemplation of the Visible World to a most Affectionate Devotion, and all the Acts of a Sincere Religion. Let him be led by the Consideration of those Divine Perfections which the wondrous Fabrick of the World discovers to be in God, unto an entire Love of him, and an ardent Desire to have intimate Communion with him, and thereby to be rendred like unto him. Who made these Beautiful Objects in the World but Beauty it self? All the Glories of the Universe are but the Rays of that infinitely Glorious Light which is above. Wherefore let us climb up by these Sun-beams to the Father of Lights: let us by these glorious Manifestations of God in the Creatures make our Access to the Creator, * *the Framer and Maker; the Father of all things*, as *Plato* often calls him. But let us rise higher than this Philosopher, (who yet was far exalted above all his Brethren-Philosophers) let the Creatures lead us to the Blessed Author of the *New Creation*, *Christ Jesus* our only Redeemer and Saviour, the Essential, Eternal, Incomprehensible Wisdom, *by whom God made the Worlds*, as the

* Δημιουργὸς τῶ πάντων, ποιητὴς καὶ πατὴρ τῶ ὅλου.

the Apostle expressly testifies, *Hebr. i. 2.* Wherefore in God the Father, and in Jesus Christ his only Son our Lord (the same undivided and Eternal Godhead) let all our Knowledg and all our Practice be terminated, for * of him, and through him, and to him are all things : to whom be Glory for ever. Amen.

* Rom. ii. 36.

The End of the First Part.

T H E

Westminster Abbey

The Abbey is a large church in
Westminster in London. It is the
site of the coronation of British
monarchs and the burial place of
many of them. The church is
one of the largest in the world
and is a fine example of Gothic
architecture. It is a very old
church and has many interesting
features. The church is a very
important part of the history of
England.

of the

1

T H E
Second Part:

Wherein the
Existence and Providence of God
Are Proved from the
Admirable Fabrick and Contexture
O F
MAN'S BODY.

C H A P. I.

The Body of Man is more excellent and perfect than those of other Creatures, as to its Stature, and several of its Organs and Vessels. This singular and peculiar Workmanship is elegantly express'd in Psal. Cxxxix. 14, 15, 16. which Words are Commented upon. In the first Noble Cavity, viz. the Head, are ob-
A *servable,*

servable, the Skull with its Sutures and its Membranes, with which it is lined; the Brain, the Face with its Forehead, Nostrils, Cheeks, Lips, Chin, Mouth, to which latter belong the Palate, Uvula, Tongue, Teeth: The wonderful Contexture, particular Use and Design of all which Parts are distinctly set forth, and shew'd to be the Effect of stupendous Wisdom.

THE Heavens and Earth are the *Greater World*, and Man the *Lesser*, according to the ancient Distinction of the Rabbins into *Gnolam Gadol* and *Gnolam Caton*; which hath been since us'd by most Writers. Wherefore having spoken of the first, *the Greater and more spacious World*, I will now proceed to speak of the second, *Man*, עולם קטן the *Microcosm*, who is the Abbreviature and Compendium of all the Classes of Mundane Beings, and participates of every thing that is found in Nature. The two grand Ingredients of this Noble Being, are a Thinking Substance and Organiz'd Matter. But it is the latter of these only which I design at present to treat of, for I undertake the Proof of a Deity from the Visible and Corporeal part of Man only. And I choose to instance in Man rather than any other Living Creature whatsoever, because he is the most Perfect
of

of all Animals, the Parts of his Body are most Exquisite and Admirable.

There is a *Peculiar* Formation of *Humane Bodies* even as to their External Figure and Shape. Their Difference from the Bodies of *Fishes* is most of all apparent: so as to *Birds*, there is a very manifest Difference in the *Fabrick* between them and Men. Yea, though *Four-footed Animals* have most of the Organs that Man's Body hath, yet this differs from them (as well as from all other Creatures) in several respects. Man's Body is more excellent, as to its Frame and Make, than that of this sort of Animals. There are those Admirable things to be observed here that are not in them. Man is of an *Erect Stature* and *Figure*, which no other Creature is of: And though it be boggled at by a * Learned Enquirer, yet he grants (which is as much as he need to establish the Erectness of Man) that his *Spine* and *Thigh-Bones* are in right Lines, whereas it is otherwise with the rest of Animals. So that from this peculiar Mark it is plain, that he is above other Creatures, and is the Prince of the Creation. This singular Configuration is no other than † a Signature of Royal Dignity, as one of the Ancients rightly said. This Upright, State-ly,

A 2

* Dr. Brown Vulg. Err. Book 4. Ch. 1. † Ταῦτα ὅτι πάν-
 τος ἀρχικὰ δοκεῖ εἶναι, καὶ ὅτι βασιλικῶς ἀξίαν ὑποσημαίνοντα
 Greg. Nyss.

4 *God's Being, &c. proved*

ly, and Majestick Frame of Body, shews that Man was made to Rule over the Brutes, and that he was design'd for yet greater Empire and Government.

This Noble Creature hath a *Head* of a spherical Form, which is almost proper to himself: And though his *Eyes* seem to differ but little, viz. as to the external colour, from those of other Animals, yet there is a greater Variation as to the inward Contexture of them. The interiour Make of the Eyes of *Birds* and *Fishes* is different from that of Man, saith Monsieur *Rohault*, *Tract. Phys. par. 1. cap. 30.* A * Learned Artist of our own hath observ'd, that there are but six *Muscles* in Mens Eyes, whereas there are eight in Brutes, there being two added of peculiar use to them; because they hang their Heads down: therefore one of these (which he calls *Suspensorius*) is serviceable to keep the Eye in a good situation, that it fall not out, and the other (which he calls *Membranosus*) is useful to guard and hide the Ball of the Eye when Beasts thrust in their Heads among Grass and Hay. An undeniable Argument of the Care, Wisdom, and Providence of the Creator, who fitted the Parts of Creatures to their special Use and proper Needs. And there are some other things in the *Eyes* of Brutes which are not to be found in those of Men,

* *Dr. Willis de Anim. Brut. cap. 15.*

Men, as another * Learned Observer tells us.

Though † *Vesalius*, that famous Anatomist of the last Age, pronounces the Fabrick of Man's *Brain* and that of other Animals to be alike, yet those who have lately handled the Anatomick Knife dissent from him, and assign some (though no great) difference between them. As to the Quantity, 'tis certain that *Man*, for his Proportion of Body, hath more than any other Creature; for *Archangelus* and *Baughinus* observe, that his Brains weigh four pounds, sometimes five, and sometimes five and a half. And according to the abundance of Brains Man hath proportionably the largest Head. It is, saith || *Scaliger*, the fifteenth part of his Body, whereas that of some other Animals is not above the fifth, sixth, or seventh.

There are sundry other things in *Man's* Structure which are not found in Brutes, as the particular Conformation of the inward parts of the *Mouth*, and other adjacent Organs, whence *Speech* is the sole Prerogative of Men, excepting a few apish Birds which have some resemblance to Man in some of those parts. Again, the *Hands* and *Fingers* distinguish Humane Bodies from others; for no Brutes are furnish'd with these. No Animal what-
A 3 foever

* Dr. Briggs *Ophthalmograph.* † *De Corp. hum. Fabric.*
l. 7. c. 1. || *Histor. Animal.* lib. 1.

soever hath a *Cbin*, but Man, said *Pliny* of old, and I do not see that there is Reason to reject his Observation. Some Beasts have the frame of their *Stomachs* different from that of Men, because they chew the Cud, which he doth not; (for the *Chewing Man* at *Bristol*, whom our *Philosophical Transactions* lately mentioned, and some other Ruminating Men in other Countries, spoken of in the Historical Observations of Physicians, are singular and extraordinary.) The situation of the *Paps* or *Teats* in Women is different from that in all other Animals, who have them placed below their Bellies; but by an especial Care and Providence it is otherwise in Women, who hold their Infants in their Arms, and so this proves most convenient for suckling them. The *Cone* of the *Heart* in Man deflects to the Left more than that of Brutes; and his *Pericardium* sticks and is fastned to the Diaphragm; but 'tis otherwise in those Creatures. There is a visible Unlikeness between Humane and Brutish Bodies, as to the *Beard*, *Abundance of Hair on the Head*, and several other things relating not only to the outward Figure, but the inward Disposition of the Organs and Vessels. Therefore I made choice of the Body of *Man* rather than of any other Creature, to discover to you the Transcendent Wisdom and Goodness of God in its Fabrick. Every thing is wrought with singular

gular Art and Contrivance: the excellent Workmanship speaks a more excellent Author.

This is that which the Psalmist proclaims aloud to the World, when he saith, * *He was fearfully and wonderfully made*; so made, that he could not but reverence and admire the Divine Maker. *My substance*, saith he, *was not hid from thee, when I was made in secret*, thou hadst the whole framing and shaping of me in the Womb: *I was curiously wrought in the lowest parts of the earth*: where he compares the Make of his Body in the Womb to *Phrygionick Work*; for the Verb *Rakam* which he here useth is *acu pingere*, to make Artificial Needlework and Embroidery: and accordingly by this Word in *Exod. xxvi. 36. xxxvi. 37.* is exprest that *Curious working in Needlework* which was us'd in the Hangings of the Tabernacle: and in *Ezek. xvii. 3.* it is made use of to signifie *divers Colours*. Thence *Rekamoth* in *Psal. xlv. 14.* is *rayment of Needlework*, suppos'd to be fashion'd with diversity of Figures and variety of Colours, and therefore is rendred by the *Septuagint* sometimes *ποικιλμα* and *ποικιλία* and by the *V. Latin*, *Varietates*, and *Vestes diversorum colorum*. So that this very fully sets forth the Wonderful and Various Formation of the *Fætus*; this

A 4

empha-

* *Psal. cxxxix. 14.*

emphatically expresseſſes that Diversity of Art which is obſervable in the different Members and Parts of it. The Body is the Soul's *Veſt*, but it is of no ordinary Make and Contexture : it is admirably wrought and ſhaped with divers Colours, and in various Lineaments and Proportions. *Symmachus* comes neareſt to the Hebrew Word, who renders it *ἐποικιλῶ*, *variegatus fui*, I was artificially wrought with Variety of curious Work, *Skin, Fleſh, Bones, Nerves, Arteries, &c.* And the *Womb* is here call'd *the loweſt parts of the Earth*, it being a modeſt Expreſſion uſed by the Holy Ghoſt to denote thoſe ſecret and remote Paſſages which are appropriated to Conception and Pregnation. And 'tis very proper too becauſe the *Earth* was as it were the *Womb* out of which Man was taken at firſt : and ever ſince, among the Writers of all Ages the *Earth* is ſtil'd a *Mother*. In theſe lower parts of the *Earth*, in theſe dark and hidden Receſſes, I was by the Divine Care and Wiſdom curiouſly wrought, ſaith the *Psalmiſt*.

Which he farther expreſſes in the next Verſe, *Thine eyes did ſee my ſubſtance yet being imperfect* (when I was but a miſ-shapen Embrio) *and in thy book all my members were written*, (Thou by thy infinite Wiſdom haſt determin'd the particular Configuration of all my Parts, even before they were completely finiſh'd) *which in continuance were*
fashion'd,

fashion'd, when as yet there were none of them, i. e. they were by a continued, gradual, and successive Formation brought to this admirable Shape which at first they had nothing of. Thus this Divine Philosopher and Prophet acknowledges that the Formation and Structure of his Body was a strange and amazing Work, such as none but God could be the Author of; and therefore if he should go no farther than his own Original and Primitive Fashioning in the Womb, he had sufficient ground to own and revere the stupendous Wisdom of the Almighty. Man's Body is a Curious Piece of Workmanship, or (in the Stile of this Divine Writer) of matchless Tapestry, of unimitable Embroidery, of most ravishing Beauty and Elegancy: the Contemplation of which alone is able to lead us to a Deity, an infinitely Wise Being, who gave it this exquisite Shape.

And this now I will particularly demonstrate to you, beginning with the Highest and Noblest Region, the *Heaven* of this Lesser World, the *Head*: for it was * *Aristotle's* Notion, that this answers to the *Heavens* in the Greater World. This is the most sublime and exalted, the most eminent and perspicuous part of this Humane Fabrick, the chiefest of all in use, and first in make; for (if we

* *De Mundo*, cap. 6.

we may argue from the Formation of a (*Chick* to that of other Animals) the *Head* and *Eyes* are, according to the famous Dr. *Harvey*, the *first Rudiments* that appear, and have any Resemblance of the Parts of a living Body. In this Noble Cavity is lodg'd a most Divine Treasure, the *Brain*, which, because it is so choice a *Viscus*, and of so great worth and use, is safely enclos'd in a *Pan* or *Skull*. This Tegument is call'd *Gulgoleth* by the *Hebrews*, from *Galgil Sphæra*, *Rotunditas*, because of its round figure, which is most convenient for defence. The *Brain* is as it were the *Kernel*, and this is the *Shell* that enwraps it: whence the French Word *Teste* (which signifies the *Head* or *Skull*) is perhaps from the *Latin Testa*, because this is as it were *Cerebri Testa*, *Cortex*, *Putamen*. And it may be I do not conjecture amiss if I say *Shell* is the same with *Skull*, only this is a Corruption of that.

That I may here display the Wisdom of the infinitely Wise Artist in the Contrivance of this Globose and Concave Covering of the Head, this *Habitation* of the Brain, or rather Nature's *Helmet* to defend it from all Injuries, it is observable, that it is at first somewhat Softish and Spungy, that it might not by its Hardness be offensive to the *Uterus* in its passage, but might rather on occasion yield to Compression. And again, it is remarkable,
that

that it is joyn'd together by *Sutures*, which are requisite at first, that the redundant Humidity of the Brain which is so copious in Infants, may evaporate by those passages: and afterwards it hardens by degrees, and hath the firmness and solidity of other Bones: but yet so as these *Dented Fissures* still remain, and thereby the parts of the *Cranium* (when there is occasion) do more or less recede from one another. Which is of great and singular advantage to it; for first, by this means the *Cranium* doth somewhat give way to Blows and Falls, and by not resisting them is the safer. Secondly, It is for the more easie Emission and Dissipation of superfluous Vapours and vicious Humours through those *Seams*. Thirdly, Hereby this hard Covering is so qualified, that it is not too close and pressing upon the Substance of the Brain. Fourthly, By reason of this it is that outward Medicaments applied to the Head become more effectual, because the vertue of them is convey'd through these Chinks. For these Reasons this Head-piece, which was made to secure that Noble part, was fastned together by these yielding *Toothings*.

And besides, it was the Work of the infinitely Wise Framer to compose this Covering of several Bones, this being for the Safety and Security of it: for if it had been One Bone, it would have been liable to be split

split and broken by a violent Stroke or Fall, and the Brain thereby would have been the more injured : whereas now the Fracture may happen to one Bone, and proceed no farther, because it is stopp'd by the neighbouring *Suture*, which secures the next part. Nor is the Brain compass'd and guarded only with this *Strong Cap of Bone*, but under this it is cloathed with two * *Coats* or *Membranes*, † one somewhat hard and thick to keep it from being touched and hurt by the Skull, the ‖ other thinner and finer, because it is the inmost *Caul*, and next to the Brain. Such is the Divine Care and Goodness in preserving and sheltering this First and Choicest part of Man with a Triple Vestment, or (as I may call it) a Cap with a double Lining, not to speak of the ** *Proper Skin* which encompasses the *Cranium*, or of the *Hair* which defends that, which are yet other Coverings. This shews the Great Concernedness of Heaven for us, and this acquaints us, that the *Brain* is a very Noble Part, and is of special and singular Use. Which is the next thing I am to treat of, and thereby to discover farther the Divine Founder of this Humane Structure.

†† The *Brain* is the Seat of the *Soul*, and the Source of *Life*, the great Laboratory of *Animal*

* *Meninges.* † *Dura Mater.* ‖ *Pia Mater.* ** *Peri-cranium.* †† *Hic mentis est regimen. Cic. Tusc. 1.*

Animal Spirits, the Spring and Fountain of all * *Sense* and *Motion*; for these are caused by those nimble and active Spirits which are dispers'd through the whole Body, and diffused into all the Members of it in order to Sensation and all the Functions and Exertments of Life. These are those fine and exalted Particles of Matter that are the Medium by which the Soul acts on the Body: that produce such great Wonders in Nature, and work such excellent Effects and Operations in us. Now, the Almighty Operator hath made it the Office of the Brain to elaborate these *Spirits*, and to send them thence by the *Nerves* into the several parts of the Body. And that this Useful Agent may be always set on work for the good of the whole Body, God hath appointed the *Heart* (another Strange and Wonderful Engine in us, which we shall distinctly speak of afterwards) to yield a continual stock and supply of Subtile Vapours from its warm Blood exhaled through the † *Jugular Arteries* into the || midst of the Brain and the Vessels that environ the *Conarion*: which, when they are there sufficiently sublimated and refined, are thence diffused with great force into the *Nervous Channels* and the whole Body.

Thus

* *Hic habet sensus arcem, hic culmen altissimum. Ibid.* † *Carotides.* || *Plexus Choroides.*

Thus there is a continual Correspondence and Conformity between the *Brain* and the *Heart*: to which purpose it may be observ'd, that when the spirituous parts of the Blood exhale up into the Brain by the *Diastole* of the Heart, the Brain is heaved up; and when they cool by the Hearts *Systole* and the taking in of fresh Air into the Nostrils, it subsides. So that the Brain hath its Pulsation, and beats as the Heart and Arteries do, as hath been observ'd by Physicians and Chirurgeons in Fractures of the *Cranium*, who then had an opportunity of discerning this Motion. And here, by the by, we might remark that the Sides of the fore-part of the Head are call'd *Tempora*, i. e. *Times*, in many Languages, because they have a set and successive Motion, like Time: and the Hours may be reckon'd by these *Temple-Pulses* as by a Clock, for there are about 3000 of them hourly in a Man of perfect Health. Thus by the Contrivance of the Heavenly Artist the *Brain* and *Heart* keep time, and so the Harmony of this Divine Machin, to which they belong, is preserv'd.

But that we may be convinced that there is nothing here but mighty Wonders, we are to observe that the *Brain*, which is (as hath been said) the Seat of Sense and Life, and the Efficient of Animal, i. e. the Finest Spirits, is it self the most dull, phlegmatick,
and

and coldest part of the Body. The substance of it is lax, spongy and porous, and is but a *Glandule*, saith Dr. *Wharton*. It is made of soft Pith and Pulp, which is liable to be shatter'd and displaced. But the Divine Hand hath cast a *Net* over it, and through it as 'twere; which holds the parts together, and hinders their Dislocation. Which strange Contexture of innumerable little Twisted Strings and Fibres (as well as its Matter) shews it to be framed for some special use and Design, which no other part of the Body is made for, and it calls upon us to admire and adore the Composer.

Next, the *Face* or *Countenance*, which is that fore-part of the Head which is always bare and expos'd to view, is to be consider'd by us. The Excellent Features of it are the greatest Discrimination between Man and Brutes: for either they have no *Face* properly and strictly so call'd, or it looks not forward as Man's doth, who hath a Body erect (which no other Creature hath) and consequently a Countenance of that posture. Here the Supreme Creator's Image is most especially discern'd: this is a Transcript of the Heavenly Spirit, this is the Mirror of that Divine Soul which is within. And therefore this part of Man is the chief Subject of *Physiognomy*, which so far as 'tis natural and sober may contain some Reality in it, and hath
been

been approved of and practis'd by the Wisest among the Ancients, as *Pythagoras, Aristotle, Hippocrates, Galen*, and others. There are generally some external Signs and Marks in the Visage which demonstrate the Temper of the Mind. From inspection of the constant and natural Lineaments in the Countenance we may sometimes guess at the Soul. For God hath imprinted these Characters there, that we may read the Dispositions and Inclinations of Men in them.

And the strange *Diversity* of Mens Countenances is no contemptible Argument of the Wisdom and Goodness of the Creator in making them so wonderfully Various. It is to be admir'd, that though all Men have the same shape and figure of their Faces, yet there are different strokes and lines in every one of them: *Sic & similes universi videmur, & inter se singuli dissimiles invenimur*, as *Minutius Felix* speaks. If Men were alike in Face as Sheep and some other Animals, what a strange Confusion would be in the World? How many Evils and Mischiefs would follow upon it? If the Visage (significantly call'd *the fashion of the Countenance*, Luke ix. 29. and *the particular appearance or form of the face*, Mat. xxviii. 3.) were alike in all Persons, Parents could not know their Children, Husbands their Wives, Relations their Kindred. Magistrates could not discern the
Guilty,

Guilty, Creditors could not know their Debtors. So Injustice, Fraud, Murder, Bloodshed, Adultery, Incest, would reign among Men, and yet there would be no way to discover and detect them. This must needs happen if one person could not be discern'd from another: which could not possibly be if they were all alike. And thus the Society of Men would have been broken, and there could have been no humane Converse. It was therefore the work of Divine and Infinite Reason, to make this Great Variety of Faces which we see, to give Men distinct Lineaments, that so they might certainly be known one from another. This different shaping of humane Countenances is a proof of an All-wise Being, and one that had a regard to the good of Mankind.

But if we particularly survey the several Parts which constitute this Divine Form in Mens Faces, we shall have yet a greater Sense of this Supreme Disposer. The *Forehead* is a singular Ornament, full of Grace and Majesty: it is the Index of Joy or Sorrow, of Severity or Mildness, of Anger or being pleas'd, of Shame or Impudence: and in brief, if the *Roman Orator* spoke good sense, it is *the door of the Soul*. The *Protuberancy* of this part is useful, for it conveniently shades the Eyes, it beats off the excess of Light which would be troublesome and offensive, and be some hinderance to the sight. B The

The *Nose* or *Nostrils* were made not only to contribute toward the Beauty and Comeliness of the Countenance, but to be of great Use and Necessity. For their Offices are first to draw in and let out the Breath, they are the proper Organ of *Respiration*. Again, they are extremely useful for the forming of the *Voice* and *Speech*, which we may observe are deficient when these parts are so. Further, this is the Instrument of *Smelling*, furnish'd with * others on purpose to discharge that Office. And I might mention this also, that it is serviceable to transmit Odours to the Brain for the refreshing of it. The *Nostrils* are instrumental in *Anger* (which is a natural and lawful Emotion if it be for just Causes) and the Agitation of them discovers this Passion, especially if they be contracted, as in some Persons. Which may give an account of that Phrase used in the Holy Book, *Exod. xxxiv. 6. Psal. lxxxvi. 15. Erech appajim Longus Narium*, as *Arias Montanus* renders it according to the letter; but the *Septuagint* translate it *μικροδύου*, *Pagnin, tardus ad iram*, and our English Translators *long-suffering*. To which is opposed *Retzar appajim Prov. xiv. 17. Brevis Naribus*, as *Montanus* renders it; *ἄγροδύου* as the *Seventy*; *he that is soon angry*, as our English Version gives

* *Os Cribrosum, Proccssus Mamillares.*

gives it according to the sense, though not the letter. But any observing Man may see that the *Original* refers to the use of the *Nostrils* in those Persons that are Angry. And accordingly nothing is more common in the Sacred Stile of the Old Testament than the words *Aph* and *Appajim*, *Nasus*, *Nares*, for *Ira* and *Iracundia*. Lastly, I have no more to say of this part, when I have added that it is for the Excretion of the redundant Humours of the Brain, and thereby to purge it. Thus the Employments of this Part are Various, as indeed there is scarcely one single Part of the Body which hath not several and different uses (as will appear from what we shall farther say) which is a convincing demonstration of what I have undertaken to prove, *viz.* That the Parts of Man's Body, and their Use, argue a Deity.

The *Cheeks*, the largest portion of the Face, conduce to the beauty and perfection of it, and are the chief seat of *Blushing*, the tincture of Vertuous Modesty. Here are hung out the Ruddy Ensigns of Shame: here Bashfulness displays it self in a fiery Colour. The provoked and heated Blood ascends hither to testify the Consciousness to some unbecoming Act. This gives an account of *burning shame*, and shews, that though it be a *Vulgar* way of speaking, yet it is founded on good reason. Nay, it seems to be the language of

the Inspired Prophet, who to express the utmost Shame and Confusion of persons, saith their *faces are the faces of flames*, Isa. xiii. 8, The *Lips* were made to be the Cover of the Mouth, Gums, and Teeth, and to be a Guard to these latter: they serve also for the forming of the Voice, and help in speaking and pronouncing of words articulately: and moreover, in Tasting they have their particular use. The *Chin*, the prominency or fore-part of the Under-Jaw, is a peculiar grace and embellishment to the Visage, and is that part which no Animal is adorned with but Man, as hath been before suggested.

With the *Mouth* (that so visible and useful Fore-door of this our humane Habitation) we take in food and drink; and that it may not only receive, but hold and contain the former of these till it be well masticated, it is Hollow and Capacious. With this also we take in and emit the Air, to convey it to the Lungs, and with this we form our Speech. So that, considering the absolute necessity of this part, we cannot but think that *Pliny* and others are fabulous when they tell us of People near the Head of *Ganges* in the *Indies* who have no *Mouths*. Moreover, with this we eject Spittle or any other superfluous Humour that annoys that part. These are the distinct Offices of this Oral Cavity. To which belongs the *Palate*, *i. e.* the Upper-part or
Roof

Robt of this Concave place, and it is serviceable both for Speaking and Tasting. Here is a * *Little red piece of spongy flesh* (hanging down from the Palate into the Mouth) which is of no mean use, for it is someways serviceable to promote the modulation of the Voice, it hinders the Drink from regurgitating out of the Mouth into the Nostrils: and it stops the defluxion of Humours from the Palate on the *Larynx*. When we consider this little Part, we may call to mind what an Inspired Man saith, and conclude that he speaks like a Good Natural Philosopher, *Those parts of the Body which seem to be more feeble, are necessary*, 1 Cor. xii. 22.

Here is the *Tongue*, the grand instrument of *Speech*, which is a Faculty that God hath vouchsafed to Man alone, and therefore we are obliged to make use of it in celebrating the Praises of our Creator, who hath given it us on purpose to extol his Infinite Wisdom and Providence in the structure and frame of our Bodies, and particularly of this Noble Part, whereby we not only make known his Perfections, but hold Converse with our Brethren in the World. We can never sufficiently admire the Excellency and Usefulness of this divine Gift of *Speaking*. And the Variety of it, *i. e.* the difference of Voice and *Speech*.

* *Uvula*.

Speech in Men is as remarkable as that of their Countenances, of which I spoke before. This is of unconceivable advantage to Mankind, and hinders that vast confusion and disorder which otherwise would happen. The *Tongue* is likewise the Organ of Tasting; and I might add, that it is helpful in transmitting the Food into the Stomach. And to all these purposes it was framed by Heaven of a soft and pliable matter, that it might contract and dilate it self, as there is occasion.

The *Teeth* (which are commonly, though not always, thirty two in those of perfect Age and Vigour) may deserve our notice in the next place: the Fabrick of which is such that we must be forced to confess it was the production of an Extraordinary and Supernatural Agent, and one that consulted our Good and Benefit. For we cannot but observe, that the Teeth are not all alike, but are of a different size and shape, according to the different Use they were design'd for. First, there are four Teeth above and four below which stand foremost in the Jaws, and are very sharp, that they may cut and divide the Meat at its coming into the Mouth, or even before it comes into it, for these *Fore-teeth* serve to bite or cut off a piece or morsel from any solid Food which we are to take, and for this purpose these *Biters*,
these

these * *Cutters*, are made with a very acute edge. Also 'tis observable, that these *Fore-teeth* conduce to the Speech as well as Eating. Next to these are placed another sort of Teeth call'd the † *Dog-teeth*, but more vulgarly the *Eye-teeth*. There are two of them in the upper, and two in the lower Jaw, or sometimes but two only, one on each side. These are more pointed than the former, and are deeper Rooted, and consequently are Stronger than they, because 'tis their work to break the food. Besides these there are the ‖ *Grinders*, which are peculiarly fitted for their employment; for after the Meat hath been cut and broken by the other two sorts of Teeth, these bruise and macerate it, and give it its last preparation for the Stomach. There are generally Ten of these in a Jaw, and they are bigger, broader, and flatter than the rest, that they may perform their Grinding the better. And because they are made use of most of all, and have the roughest work, therefore the Provident Maker furnish'd them with stronger Hold-fasts than any of the Teeth. These great *Jaw-teeth* (as they were call'd ** of old as well as they are now) have three or four Roots or Fangs, because these only are used in *Chewing*, which requires Strength. †† One hath

B 4

lately

* *Incisores*, or *Incisorii*. † *Canini*. ‖ *Molares*. ** *Me-*
talgnoth, Prov. xxix. 17. Prov. xxx. 14. †† G. *Havers*, M.D.

lately taken notice of Divine Providence in this, that the Fabrick of the *Grinders* is fitted to that kind of Food which *Creatures* feed upon: in Men they are Obtuse, because their Meat is generally soft: in Dogs and some other Animals that live usually on harder Food they are Sharp, with several points: in those *Creatures* that feed on Grass and Hay, or Corn, they rise up with ridges, and answer to the inequalities of a Mill-stone. And in other Animals that feed on Flesh as well as Grass, they are of a middle nature, and fit for the mastication of both.

This must be said, that most of the *Teeth* (as well as the * *Jaws* in which they are set) were designed for *Chewing*: and it is certain, that a considerable time should be employ'd in this work; for all solid Meat we take should be *chew'd well*. We *English* are often negligent herein, from whence follow Indigestion and other great Inconveniencies, as a † *Thinking Writer* hath observ'd. I will only take notice here in the Close, that some are born with *Teeth*, which is thought by some to be as Ominous as it is Strange: but this we are certain of, that it is an Indication of more than ordinary Strength and Vigour

* *Jaws*, qu. *Chaws*, from *Chawing* or *Chewing*: and this very word *Chaws* is retain'd by our Translators *Ezek. xxix. 4. xxxviii. 4.* † *Mr. Lock of Education.*

gour of Nature. *M. Curius Dentatus* (who had his Name on that account) and *Papyrius Carbo*, are mention'd as Examples of this by * *Pliny*. And our King *Richard III.* was another Instance of it: and it is said that a Neighbouring Prince (who is a Biter) was born into the World with these Weapons.

* *Lib. 7. cap. 16.*

CHAPTER

CHAP. II.

The excellent Fabrick of the Ear, and the several Parts and Organs which contribute to the Sense of Hearing. The peculiar Structure of the Eyes; where a large and full Account is given of their Humours, Coats, Muscles, of the Eye-brows and Eye-lids, and the Hair belonging to both. The transcendent Usefulness and convenient Situation of this part of the Body.

THE Rare and Artificial Composition of the *Ear*, and the *Organs* that are serviceable to *Hearing*, is next to be consider'd. Who can so much as doubt whether an Almighty Power and an Immense Wisdom were concern'd in the Texture of these Parts when he observes that the *Ear* consists of these three wonderful Cavities? 1. A large one call'd the *Tympanum* or *Drum*, because it, with the Membrane over it, hath such a resemblance. In this are the four little Bones which are call'd the *Hammer* (because 'tis of that shape,) the *Anvil* (something like it) the *Stirrup*, and the *Orbicular Bone*. 2. An other lesser Cavity, stiled the *Labyrinth*, which hath a hole in which the *Stapes* is terminated. This *Labyrinth* consists of four little round Holes or Caverns, into which the
Air

Air is received and defecated, and sent to the *Cochlea*, 3. Then, the other Cavity (smaller than the former) is this *Cochlea*, call'd so because 'tis in the figure of a *Snails shell*.

Now, no Man of any consistency of mind can think that all this *Artifice* shew'd in the framing of these *Tortuous Caverns* and *Various Meanders* was the blind effect of Matter and Motion. No: here was *Design* and *Contrivance*: all this *Apparatus* was to compleat and perfect the Sense of Hearing. The *Ear* hath these Curious and Various Hollows that the Air and Sound may be retain'd in them for some time, and not easily vanish thence, that so the Hearing may be the more orderly and distinct. And even *Musick* it self is beholding to the particular Fabrication of this part of the Body: for though the Nature and Essence of Musical Sounds depend upon the Tremulous and Uniform Motion of the Air and some other Causes (as an * Ingenious Person hath lately shew'd) yet it is not to be doubted that these Harmonious Strokes are much beholding to the Constitution of the Organs of Hearing, and the particular frame of the Ear in some persons especially. By reason of these *Anfractres* and *Ambages* the sudden Irruption of the Air either very cold or hot cannot hurt the Brain, nor can the excess

excess of Noise endamage it, for by this Obliquity and Crookedness of the Passages the Air is qualified and moderated. These are the Reasons, without doubt, of this particular Workmanship of the Ear, the many Windings and Turnings of it. And as all these Parts which I have mention'd are of absolute use and necessity, so the outward Lobe or Flap of the Ear, that little soft and fleshy part, seems to have been made to be an *Ornament* it self, and for the receiving of one: and accordingly we learn from the most Authentick Monuments of Antiquity, that this was the first and earliest, as well as the most natural piece of Finery that was used, especially by the Fairer Sex.

The stupendous Fabrick of the *Eyes* invites us next to behold them, and therein to see a *God*. There are three Celebrated *Humours* (as Anatomists stile them) or *Diaphanous Liquors* which this part of the Body is famed for: the foremost of which is the *Watry* one, call'd so because 'tis a thin *Lympha*, and void of all Colour. This is placed in the fore-part of the *Eye*, that the *Images* of things may be first rudely formed here, and thence more exactly delineated in the *Crystalline*. Which is the next, and is call'd so by reason of its Transparency: its situation is in the middle or center of the *Eye*. The third, which is the *Vitreous Humour*, is the remotest, being

being seated behind the *Watry* and *Cryſtalline* ones ; and being much bigger and of a greater conſiſtency than theſe, it is uſeful ſomewhat to ſtop and terminate the Viſive ſpecies : and accordingly is conveniently placed at the bottom of the Eye, neareſt to the Brain. Theſe are the Clear and Pellucid Caſements of the Body to let in Light, and to tranſmit its Beams in order to Viſion : for from the fit refraction of the Luminous Rays which paſs through theſe different *Humours* (different not only as to their quantity but conſiſtency) the Sight is made and promoted. So that, before we go any farther, we have enough to convince us that this particular Make of the Eye was from an Intelligent and Provident Director, who fram'd the ſeveral Parts of Man's Body to ſpecial and peculiar Ends, and particularly deſign'd the Eye to be the Organ of Sight.

But theſe *Liquors* which are found here, and which are as Glaſſes and Spectacles to the Brain in order to Seeing, would be wholly uſeleſs to this purpoſe if their Tranſparency were not qualified and check'd, if there were not ſomething (like the Foil in a Looking-glaſs) to unite and retain the viſive forms in the Eye. This therefore is done by certain *Membranes* or *Tunics*, which more powerfully refract the Rays of Light, and are ſerviceable for the farther ſhaping and retaining

retaining the images of things; and besides, they are serviceable to separate one *Humour* from another, and to keep and preserve them in their proper places and particular Apartments; so that these Liquid Substances are steady and fixed. The first and outermost of all these *Coats* is that * *Common* one which covers all the Eye, unless it be where a perforation is left for the *Ball* or *Pupil*. This is that Skin which makes the *White of the Eye*. The second hath its † name from its *Hardness*, for (as the Learned Dr. *Willis* observes) this being one of the upper *Coats* of the Eye, it was to be strong, and as a Fence against Injuries. And it is also called the *Horn* *Tunicle*, because it is of the colour of a thin bright piece of Horn, *viz.* in the fore-part of it, but it is opacous behind. Strictly speaking (as another Learned Physician notes) it is the foremost part of this Skin which hath the Epithet of *Corneous*, and the hinder is properly the *Sclerotick*. This Membrane enfolds the whole Eye, as the other before mention'd doth: only there is an Aperture reserv'd for the *Pupil*.

The third is that which is call'd by Anatomists the || *Grapy*, and also the *Choroides*: or, to be exact, the Anterior part only is that which should be call'd *Grapy*. It is generally

* *Adnata.* † *Sclerotica.* || *Uvea.*

nerally black in Man, and therefore hath its Name because it resembles the skin of a Black Grape when 'tis press'd. However, the inward Superficies of this Membrane is black, to determine and fix the Rays. It encloses the Eye on all parts, the *Ball* excepted, where 'tis full of Holes to let in the Light.

Out of this Coat are formed and produced the *Pupil* (known by the name of the *Ball* or *Black of the Eye*) and the *Iris*, both which are very Remarkable Curiosities. The former is a Round *Hole* in the middle and fore-part of this *Uveous Membrane*, and it is so commodiously framed, that it is capable of being contracted or dilated (and consequently of being lesser or bigger) as occasion is, i.e. according to the difference of Objects, or rather the difference of Light which the Eye receives into it when it beholds Objects. In this *Apple of the Eye* (for so also 'tis most vulgarly call'd) appears the Little Image of the person who looks upon it, whence 'tis call'd by the *Hebrews* *Isbon* (*Deut. xxxii. 10.* a Diminutive of *Isb*) *Virunculus*, because the Pourtraiture of a Little Man is seen here: and with the *Greeks* it hath the name of *αἰθεν*, *Puella*, for the like Reason, because one of the other Sex may as well be seen in this Looking-glass. Accordingly it is likewise in *Hebrew* call'd *Bath gnajin*, the daughter of the Eye,

Eye, *Pfal.* xvii. 8. and among the *Latins* *Pupilla*, i. e. *Parva puella*. Though some Criticks think they give it this name because it is a part that is *tender* and *delicate*. Whence in the fore-named place 'tis said, *Keep me as the Apple of the Eye*: for this is a very choice part, and must be preserved and guarded with great Care and Circumspection.

And behold yet farther the wonderful Contrivance of that Omniscient Mind who framed this excellent part ! In this *sable* and *dark* Spot of the Eye is the *Sight* placed (whence 'tis call'd the *Sight*,) or here at least the *Visive Faculty* is first exerted, though (as you shall hear anon) 'tis perfected in the next Membrane. This little Obscure Hole is the inlet to all our Light. This indeed is worthy of the Great Creator, who in the first Production of the World brought Light out of Darkness. This I may call Nature's Window in the Body, at which the *Visive Rays* enter, and strike upon the *Crystalline Humour*, and from thence are refracted to the bottom of the Eye, where the Vision is consummated.

This Black Circle which I am now speaking of, is environ'd with a *Bright Iris* or *Rainbow*, so call'd because 'tis of divers Colours: though 'tis true that in some Creatures it is black, in some grey, in others blue, according as this Uveous Membrane is colour'd.

This

This distinct Part of the Eye is of a peculiar Make, it consisting of certain * *Nervous Fibres*; which, like small Hairs, issue from the *Pupil*, like Rayes from a light Body, all in a Circle. These, as *D. Willis* rationally conjectures, are instrumental in the Contraction or Dilatation of the *Ball* of the Eye, and (as he adds) the main Vigour and Briskness of the Eye are seated here.

The fourth and last Membrane (for though some *Ophthalmists* have talk'd of a Fifth, viz. the *Aranea*; yet our late Anatomists, who have been more exact in their Enquiry, assure us this is not to be found) is the *Retina*, so named because 'tis fashioned like a *Net*. Though there were some Preparations and Initiations of *Sight* in the *Pupil*, yet this Part must be judged the chief Organ of it: For here the Images of Objects are pourtraied, and thence by the *Optick Nerve* represented to the Brain to be examined and judged of by the Soul. All the other *Coats* (as well as the *Humours*) were but serviceable to this: This is the Principal Seat as well as Instrument of actual and compleat Vision. And the particular Situation and Make of it were designed for this very Purpose, for this is the farthest and inmost Membrane, and is nearest of all to the Optick Nerve and Brain:

C

Yea,

* *Processus Ciliares.*

Yea, 'tis made out of the innumerable Filaments of this very Nerve, so that there is an immediate Commerce with the Brain. Besides, all Parts in the Eye are convex but the *Retina*, which is concave, and that purposely, that it may be fitter to receive and retain the visive Rays, or rather the Forms of them, and then transmit them to the common Receptacle of Sense. This is the curious Frame and Contexture of the *Eye*, in respect of the several *Humours* and *Tunics* with which it is furnished: And who espies not the Deity through them?

It is granted that the Antients and Moderns agree not as to the particular solving the *manner of Sight*. An * ingenious Man, who hath been curious in anatomizing the *Eye*, confesses ingenuously that it is by *unknown Ways* that this Exactness of Sight is effected by these several Organs and Parts. But they all agree to admire the excellent and wonderful Structure of the *Eye*: They jointly acknowledge the Aptitude of the several Parts to reflect and refract the Rays, and the Fitness of the *Retina*, especially to receive the Impressions of Light, and the admirable *Tone* of the *Optick Nerve*. In brief, they are all astonish'd at the Position and Configuration, the excellent Texture and Composition of this Organ. Let a late expert Anatomist speak for all
the

* *W. Bridg M. D.*

the rest,* "If the Fabrick of the Eye be narrowly
"observ'd and consider'd, surely there is not a
"Man living who will not be rapt into Admi-
"ration of the infinite Wisdom of the supreme
"Deity, who in the Structure of these Or-
"gans was so much the more accurate, by
"how much the Sense of seeing surpasses all
"the other Senses in Excellency and Worth.

Though 'tis impossible to tell the particu-
lar way how the Sight is performed by the
Help of these several *Humours* and *Membranes*,
yet we are certain it is done by them: Of
which we have this Demonstration, that if
any of these Parts fail, if any of these innate
Liquors be deficient, or any of the *Coats* vitia-
ted, the Sight is impaired, or wholly lost, as
is evident in *Suffusions*, *Strabism* or *Squinting*,
the *Pin* and *Web*, *Cataracts*, though perhaps
the second of these may be caused, not only
by the misplacing of the *Crystalline Humour* (as
'tis generally said) but by some Defect in the
Muscles. And this here might remind me to add
something concerning the unparallell'd Stru-
cture of the *Muscles* which belong to the Eye,
and which are another Argument of its Divine
Workmanship. Anatomists mention six, four of
which are *direct*; the first to lift it up, the second
to move it down, a third to move it to the right,
another to the left side: The other two turn the
Eye *about*, and serve for oblique Glances.

* *Isbrand de Dignerbroeck Anatomie Corp. Hum.*

I propound this also to be considered, that the Eye is made with a *round Prominency*, that we may not only see things which are before us, but those which are on either side of us. Which latter we could not possibly do if the Eye were flat, and if it were not set out a little beyond the Place where it is fixed. Both which argue the Providential Care of Heaven towards us.

And because this Part of the Body is of extraordinary Use and Necessity, as well as of Beauty and Comeliness, the Omniscient Mind who framed it, hath taken especial Care of its Safety and Preservation. This is observable in sundry Particulars, as first, the Eyes are lodged in two safe Sockets, two strong *Boney Cavities*, where they are securely enclosed and defended from Hurt. And likewise the impendent *Brow* and the prominent *Nose* save them from hard Strokes and Blows. Moreover, there are *Eye-lids*, to be a farther Security and Defence to them, which are to be closed at Pleasure to prevent that Danger which may accrue by too much Light, or by Dust, or Smoke, &c. Hence, if we may credit a good old Grammarian, who was well skill'd in the Derivation of Words, the *Eyes* in *Latin have their Denomination from this Cover which God hath given them. The

Upper

* *Oculi ab oculendo, i. e. regendo. Varro.*

Upper Lid especially is most remarkable, it being as a *Portcullis* (for to that Anatomists generally compare it) clapt down every Night for the Eyes Safety, and at all other times when there is occasion for Sleep : Or whenever the Eye is assaulted, this Part is let down presently to secure it : (I say *presently*, for its Motion is with great Expedition, and thence *Gnaphgnaphim* is the Word among the Hebrews for *Palpebra*, from *Gnaph*, *celeriter se movere* : And the doubling of that Word denotes the Quickness of the Agitation, the Suddenness of the Vibration of this Part.) If *Plempius* had not been *Purblind*, as to his Mind as well as Eyes, he would not have blamed (as * he doth) the Formation of this Part of Man which is so peculiarly contrived. This is the true Reason of the Fabrication of the *Eye-lids*, and therefore Fishes are destitute of them, because living in the Water they are not so obnoxious to Injuries and Blows, or troublesome Flies, or any thing that may hurt the Eye ; and again, because these Creatures sleep not, or very little.

Farther, observe that these *Eye-lids* are fortified with *stiff Hair* as with Palisadoes against the Incurſion of Flies and such like small Bodies as I have mentioned before, which would molest this Part. Nay, 'tis to be remark'd

C 3

that

* *Ophthalmograph.*

that this Hair with which the *Eye-lids* are edged and bordered, never grows longer than it is at first, but hath a certain Dimension which it doth not exceed: Whereas no other Hair in the Body doth the like. Which is a palpable Evidence of the divine Care and particular Disposol in this matter, *viz.* that these Hairs may be a Guard to the Eye, and yet not in the least impede the Sight, which they would certainly do if they grew long. And farther yet, we may take notice that these Hairs are set thin, that they may not be any Obstruction to the seeing. So that considering these wonderful Circumstances, which visibly testify the Wisdom of the Maker, we have reason to abhor and condemn that blasphemous Passage of a * Physician of the last Age, that if he had had the Formation of the *Eye-lids* of Man, he would have contrived them quite otherwise. This is unreasonable and rash as well as impious, for we plainly see that this Guard of the Eye could not have been formed with greater Wisdom and Contrivance.

Moreover, above the Eyes there is an Arch of Hairs called the *Hairs of the Eye-brows*, which were placed there for the Ornament of the Face, for unless these were a Beauty, *Mahomet* would not have promised
his

* *Plempius in Ophthalmograph.*

his Followers the Converse in Paradise with Women whose *Eye-brows* shall be as wide as the Rain-bow. They were no less made for the Preservation of the Eyes, for these do in some measure keep off Sweat from sliding down from the Head or Forehead into the Eyes. So admirably fenced and guarded is this curious Piece of Workmanship by the Celestial Operator of it. This is the Care he took of this Part which is so noble and so useful, and is so valued by us. Whence, * *to pluck out the Eye* was an antient proverbial saying to express the Loss of those things which were most dear and precious to us.

Our Saviour hath spoken of this Part in a most expressive and comprehensive Manner, *The Light of the Body is the Eye*, Mat. 6. 22. This is the *Light* or *Lamp* (for that is the true rendring of the Word $\lambda\upsilon\chi\eta$) which directs and guides us in all the Actions of the Body, in all the Affairs of Life wherein Corporal Sense and Motion are concerned. For, as *Philo* saith well, what the Mind is in the Soul, that the Eye is in the Body, for both of them see, the one intelligible, the other sensible things. Yea, it is certain that the Eye is the Mirrour of the Mind, there we may as 'twere see the Soul, there the inward Affecti-

C 4

ons

* Mat. 18. 9. † $\text{Ὁπερ ὁ νοῦς ἐν ψυχῇ τῷ ὀφθαλμῷ ἐν σῶματι βλέπει ὁ ἐκείνους}$. De Op. mundi.

ons and Propensions of it, especially those of *Compassion* and *Kindness* discover themselves, whence by a good * Eye is meant a *benign*, and by an * evil one an *envious* and *covetous Mind*: And these are Phrases used by the *Hebrew Doctors* and *Talmudists*.

We might farther take notice that this *Light* was wisely placed in the uppermost and highest Region of the Body, as on a Watch-Tower, that thereby we may look about, and discern Dangers afar off, and that by this means the Eye might preside over the whole Body and all the other Senses. What the Sun is to the great World, that the Eye is to the lesser: It is the Guide, Light, Life and Cherisher of it. And finally, to put a Period to our Remarks on this Head, as there is a double Organ for the Sense of hearing, so there is for this of seeing; there is a *Pair* of these glorious Lights in the Body, that if one fails, the other may supply its room. Therefore we may justly look upon *Pliny's* Relation as fabulous where he talks of People of some Parts of the World with but one Eye; for indeed, such is the Goodness and Liberality of our Creator that there is not any Animal monocular in the World. Thus I have gone thro' the various Parts which constitute the
Face

* Prov. 23. 6. 28. 22. Mat. 6. 23. Mark 7. 22. Luke 11. 34.
Mat. 20. 15.

from the Fabrick of Man's Body. 41

Face or Countenance, and I have only this one thing to add, which the Lord Bacon in his *Essays* suggests to us, that a Man shall see Faces, which if you examine Part by Part, you shall find never a good one, and yet all together do well. Which is a farther Illustration of the Divine Art, Wisdom and Providence. So much for the Face, which consists of several Parts, and thence perhaps פנים (a Word in the Plural Number) is used among the *Hebrews* to express it.

C H A P.

ons and Propensions of it, especially those of *Compassion* and *Kindness* discover themselves, whence by a *good* * *Eye* is meant a *benign*, and by an * *evil* one an *envious* and *covetous Mind*: And these are Phrases used by the *Hebrew Doctors* and *Talmudists*.

We might farther take notice that this *Light* was wisely placed in the uppermost and highest Region of the Body, as on a Watch-Tower, that thereby we may look about, and discern Dangers afar off, and that by this means the *Eye* might preside over the whole Body and all the other Senses. What the Sun is to the great World, that the *Eye* is to the lesser: It is the Guide, Light, Life and Cherisher of it. And finally, to put a Period to our Remarks on this Head, as there is a double Organ for the Sense of hearing, so there is for this of seeing; there is a *Pair* of these glorious Lights in the Body, that if one fails, the other may supply its room. Therefore we may justly look upon *Pliny's* Relation as fabulous where he talks of People of some Parts of the World with but one Eye; for indeed, such is the Goodness and Liberality of our Creator that there is not any Animal monocular in the World. Thus I have gone thro' the various Parts which constitute the
Face

* *Prov.* 23. 6. 28. 22. *Mat.* 6. 23. *Mark* 7. 22. *Luke* 11. 34. *Mat.* 20. 15.

from the Fabrick of Man's Body. 41

Face or Countenance, and I have only this one thing to add, which the Lord Bacon in his *Essays* suggests to us, that *a Man shall see Faces*, which if you examine Part by Part, you shall find never a good one, and yet all together do well. Which is a farther Illustration of the Divine Art, Wisdom and Providence. So much for the *Face*, which consists of several Parts, and thence perhaps פנים (a Word in the Plural Number) is used among the *Hebrews* to express it.

C H A P.

C H A P. III.

The Neck contains two Passages or Channells of a very admirable Contrivance, viz. the Wind-pipe with its Larynx and Epiglottis, and the Throat or Gullet. The second or middle Partition of the Body, viz. the Breast is also shewed to be the Product of an omnipotent and intelligent Operator. The particular Use and Serviceableness of the Lungs, and the peculiar Composure of them in order to this. The proper Office of the Heart. Its Vessels for conveying of Blood. The Circulation of this noble Liquor. The Swiftmess of its Motion. The Situation of the Heart. The useful Membrane which encloses it. The several Uses of the Diaphragm.

I Should now descend from the Head to the next celebrated Partition of Man's Body, and that is his * Breast. But first we must take notice of the Passage to it, the Neck, that fair and streight *Isthmus* which joyns these Regions. This is the round Pillar that sustains the Head: This is the *Atlas* that upholds that Heavenly Part: The Inside of it is the Throat, which is furnished with two most useful and admirably contrived Cavities or Pipes.

The

* *Thorax.*

The * first is that which is seated in the forepart of the Neck, and is that Vessel by which the Air is taken and sucked in, and also breathed forth: And therefore this Pipe leads to the *Lungs*, yea, is inserted into them, and several † *Branches* of it are spread through the Mass of the Lungs. Besides, this is the principal Instrument made use of in forming the Voice, and unquestionless the peculiar composition of it, the admirable Fabrick of its *gristly Rings* was in order to this. The || *Uppermost Part* of it is more particularly and signally instrumental to the Speech and Modulation of the Voice: and it is to be observed that the all-wise Contriver hath added a ** *Cover*, (which is a small Flap or cartilaginous Membrane, somewhat like a *Tongue*, and thence hath its Name) to this Head or Top of the *Wind-pipe*, that, when we are swallowing, none of the Meat or Drink may go down into this Cavity. For so it is that what we eat and drink cannot be conveyed into the other Passage the *Gullet* (of which I shall speak next) but it must first pass over the uppermost End of this Pipe: Wherefore this Flap covers this End when we swallow, and hinders the passing down of the Meat and Drink into the *Weasand*. So that it appears hence, this little

* *Aspera Arteria*, the Wind-pipe, the Weasand. † *Bronchia*. || *Larynx*, the Throtle. ** *Epiglottis*.

tle Piece of Flesh is of absolute Necessity, and we can neither eat nor drink without it. Can the most hardned Atheist perswade himself that these things were by chance, or from mere Matter moved? Indeed I can scarcely think that any Man can entertain such Thoughts. Nay, it might be added, as farther remarkable, that this *Cover* we have been speaking of, is not so close but some humid Liquors (as Lohocs and the like lambitive Medicines for Distempers in the Lungs and Breast) may be gently conveyed that way, and descend by the sides of the *Larynx* unto the *Lungs*, which still shews the Art and Wisdom of the Contriver.

The * *second Passage* or *Pipe* is that which is placed behind this *Cover*, and the *Wind-pipe* to which that belongs, and is seated next to the *Vertebrae* of the Neck. This is that by which we let down our Meat and Drink, and therefore leads directly to the Stomach. As the forenamed Cavity is the *Fistula* of the Lungs, so this is the Tunnel of the Stomach, and accordingly is adjoined to the upper Orifice of it, as that is to the Lungs. Both these Vessels are of indispensable Necessity: Without the one we can neither breath nor speak, and without the other we cannot have any Food or Nourishment conveyed to us to
sup.

* *Oesophagus*, or *Gullet*.

support our Natures. And it may be this latter as well as the former, is someways serviceable to the making of a Vocal Sound: For there are several Instruments that concur to promoting the Pronunciation, and rendering the Sound Articulate. Thence the *Hebrews* and others divide their *Letters* into *Guttural*, *Dental*, *Labial*, *Lingual*, and others are denominated from the *Palat*.

And now, having observed what *Passages* are into the *Breast*, I will speak of that it self, that large and capacious *Venter*, that middle Region of Man which contains all the Parts between the *Neck* and the *Midriff*. And here we are to take notice of the divine Workmanship in those two principal Vessels which the *Breast* contains, *viz.* the *Lungs* and the *Heart*. From the admirable Structure and exact Motions of the former a * pious Physitian of our Age takes occasion to admire (though he saith he cannot do it *enough*) the excellent Artifice of the divine Creator evidently adapted even unto Mathematical Rules, for here he plainly appears (as he saith) ὁ θεὸς παντοκράτωρ
How duly and orderly do these *Bellows* (for so they are not improperly call'd) discharge their Office of attracting and emitting the Air ? How faithfully do they serve to *Respiration*, which is for the ventilating and cooling
ing

* Dr. Willis *Pharmaceut. Rational.*

ing of the Blood, or (as others think) for the attenuating and refining, the subtilizing and enkindling of it? For by means of the Subtilty of the Air which is taken in, the Heat in the Heart is provoked and blown up into a vital Flame.

I will not here dispute whether the *Lungs* follow and depend upon the Motion of the Breast and Midriff, and are filled and moved as Bellows are, because they are distended; or whether (as some of late contend) they are dilated by the *elastick* Force of the Air rushing in, and so upon their Extension follows the swelling of the *Diaphragm*, and thereupon the Motion of the *Thorax*. This is *Inspiration*: And then in *Expiration* the *Diaphragm* is contracted, and returns to its right Figure, and the Air is expelled. Neither will I question, Whether it be a collateral End of *Respiration* to discharge and expel an excrementitious Fluid out of the Mass of Blood, as * the excellent Author whom I have formerly cited, thinks he can sufficiently prove.

But this we are sure of (laying aside all Disputes) that the *Lungs* are the great Instrument of *breathing*, and that they are absolutely requisite for the admitting of the Air in order to the rouzing of the vital Spirits, and quick-

* Nat. Hist. of the Earth, Part 4.

quickning and maintaining the Flame of Life: for the sensitive Soul is fed by Air, as the Body by Food. And we are sure of this likewise, that they are necessary Organs of Speech and Voice, of articulate and significant Sounds. And we have no reason to doubt of this, that the great Architect and Frammer of Man's Body hath particularly fitted and composed the Lungs for these Purposes, for they * are light, spongy and flexible, and full of hollow Places, to hold the Air, and convey it through hidden Passages to all the Body: And they are wide and capacious that the Air may play in them, and have its full Scope in the Cavity of the *Thorax*. And moreover, that they may be firm and steady and so perform their Operations with the greater Certainty and Accuracy, they are on the Back of them fastened to the *Spina*, and thereby become fixed. This may convince us that they are the Work of a supreme and primary Cause, who is Owner of infinite Understanding, and doth all things with Skill and Counsel. Wherefore that is an excellent Spark of Devotion in the *Talmud*, *At every Breath that a Man breatheth, he ought to praise God his Creator.*

The

* Whence they are call'd *Lights*, because considering their Bulk they are the lightest Parts of all the Body.

The other rich Treasure in this *Chest* is the *Heart*, the Fountain of natural Heat, which it disperses over all the Body by vertue of its peculiar Office, which is to make Blood, and to distribute it by the *Arteries* into the Parts. Whether the so deservedly admired Motion of the Blood be from an *infinite Faculty* (as *Galen* thought) or from *Rarefaction* which expands the Heart (as *Cartes* determines) or from the *Air* taken into the Lungs (as Mr. *Hobbes* suggests) or from the *Quantity* or *Copiousness* of the Blood falling into the Heart, which labors to expel it thence by a Constriction of its Fibres, whereby the Cone of it is brought nearer to the *Basis* (as Dr. *Charlton* thinks) I will not here dispute, but this we are certain of, that an intellectual Spirit was the first Cause and Efficient of it : And any considerate Man that takes notice of the wonderful Make and Figure of the Heart, and of all the Vessels subservient to it, cannot but acknowledge as much. Therefore a * celebrated Anatomist of our own, resolves the Motion of them and of the Blood into a *divine* and *supernatural Principle*, not to be conceived and explained by us. We know that when the Blood flows into the right Ventricle of the Heart, this is dilated ; and when it is thrust out thence, this is contracted ; but the true
na-

* Dr. *Lower*, de *Corde*.

natural Spring of this * double Motion is hid from us. Whether the Motion of the Heart depend upon the Blood, or the Motion of this depend on the Heart (because if it be a *great Muscle*, as not only *Hippocrates* and *Galen*, but some modern Philosophers and Physicians have averred, it seems of it self to be made for Motion, being actuated by Spirits, and drawn by Fibres) it is not my Business here to enquire, but this is the thing which ought to employ our Thoughts and excite our Devotion, that (whatever second and natural Causes may be assigned of this *Phænomenon*) the supreme Author and Contriver of it is some intelligent Substance, and it is impossible it should be otherwise. For the whole stupendous Contexture of the Heart and its double Ventricle, with the four Vessels in them, *viz.* two *Veins* in the right, and two *Arteries* in the left Side, the former to convey the Blood to the Heart, the latter to carry it off, together with the various *Nerves*, *Fibres*, &c. is a Work of Understanding, Prudence and Judgment; for all these Parts have Relation to one another, and are mutually helpful in their Operations, and they all apparently conspire for the Good and Welfare of the Body.

D

Who

* *Diastole* and *Systole*.

Who can sufficiently admire the *Circular Conveyance* of that noble Liquor through the * *greatest Vein* of the whole Body (into which all the other Veins empty and disembogue their Blood) into the *right Ventricle of the Heart*, out of this into the *Lungs* through a capacious *Artery* (falsely called a † *Vein*) which hath its Original from the Heart, and is divided into many Branches which are dispersed through the Lungs ; out of this *Parenchyma* of the Lungs into the *left Ventricle of the Heart* through a remarkable *Vein* (corruptly call'd an || *Artery*) which hath its Rise from the Lungs, and is mixed with the Branches of the *Aspera Arteria*, and the *Arterious Vein*? And so when the Blood is digested and perfected in both those Ventricles of the Heart and Lungs, it is carried out of the left Ventricle into the *bigger Sort of Arteries* through the ** *great Artery*, which proceeding out of the Heart disperses its Branches through the whole Body, and out of the *lesser Arteries* (not by *Anastomoses* or *Inosculation*s, as some have thought, but) through the Substance of the Flesh into the *lesser, and then the greater Veins*, and thence thro' the *Vena Cava* into the right Ventricle of the Heart again, and so the *Circulation* is made. Or, the short is, that the

Heart

* *Vena Cava.* † *Vena Arteriosa.* || *Arteria venosa.* ** *Arteria aorta.*

from the Fabrick of Man's Body. 51

Heart hath on one side of it the *Vena Cava*, and on the other the *Arteria magna*, both which great Trunks have Branches dispersed through all the Body, even the extremest Parts, and are continued to one another by capillary or small Vessels, and so there is no Interruption of the circular Course of the Blood, but it returns to the Place from whence it first set out. These are the Journeys of the Blood, these are its several Stages, these are the distinct Channells and Vessels it moves through. Thus by the Heart and other Passages, as 'twere in a Water-engine, it is carried in a constant Course round: Which is a sufficient Evidence that these Machines were at first made, and then set into Motion by an omnipotent and wise Being.

And the Speediness of this Motion is as remarkable as the Circulation it self: For from the Pulses, which are the sensible moving and beating of the Arteries, and are made as often as the Blood rusheth out of the Heart into these Vessels, we may gather the swift Career of this liquid Substance. *Primrose* is singular in his Opinion, and reckons but seven Hundred Pulses in an Hour: Other Physicians rise much higher, but with great Inequality, they being more used to feel, than tell the Pulses. *Harvey* reckons two Thousand, *Regius* three Thousand, *Bartholine* about four Thousand; for according to the different Temper

and Habit of the Body the Agitation of the Blood varies, and consequently the Circulation of it is finished sooner in some than in others. If we speak of what is commonly experienced in most Persons that are healthful and well disposed in Body, and are of a just Stature, it is generally agreed that the Heart usually gives in the Space of an Hour about three thousand Strokes. The whole Mass of Blood (which in a Man's Body who is adult, seldom exceeds Twenty four Pounds Weight, or is less than fifteen) passes through the Heart and whole Body six or seven times in an Hour in some, oftner in others : Yea, a late * learned and applauded Physitian tells us, that in some Persons all the Blood passes through the Body thirteen times in one Hour. And he endeavours to shew exactly that the Situation and Structure of the Heart are fitted for this swift Motion, that the Vessels are wonderfully made to distribute the Blood through the Body in so short a time, and to perform their whole Circle and Periodical Revolution.

This more particularly may be observed, that this noble Mover is placed exactly in the Middle of the Breast (and in a manner of the whole Body) that the Influence of it may equally reach all Parts : Though indeed
the

* Dr. Lower. *Traſſat. de Corde.*

the Pulse is more sensible on the left Side, which is by reason of the *left Ventricle*, wherein the vital Spirits are elaborated, and where is situated the *great Artery* that conveys them forth thence, both which are on the left. And besides, the Cone or Point of the Heart deflects rather to the left Side, to give way perhaps to the Ascention of the *Midriff*.

That this choice Vessel of the Heart may be defended and preserved, it is encompassed with the *Lungs*, which hang on both sides of it, and are call'd by some Anatomists the *Hearts Pillow*. And add to this that this precious Treasure is enclosed in a Membranous Covering, which is stiled the *Pericardium*. As the Heart is fastned to a Part of the *Spina* to keep it steady, so this *Capsula* is fastned to the *Midriff*, to keep it in its right Situation, and also to defend it from Injuries. And it is not to be omitted, that within this Membrane there is a *serum* or *thin Liquor*, which is placed here on purpose to keep the Heart moist, and consequently to promote its Motion: Whereas if the outward *Superficies* of the Heart were depriv'd of this serous Matter, it would (it is probable) through continual Agitation and Heat grow dry, and wrinkle, and be made unfit for Motion. This *Lympha* therefore is of great Use, and (as all the other things before mentioned) convinces us that the Fabrick of the Heart was from an under-

D 3 standing

standing Mind, and could not be from any other. And after all, this may be observed (which is very strange and wonderful) that the Heart is *insensible*, as * Dr. Harvey proves from one who had a Fracture in his left Side, so that this Part was exposed to view, and was handled, but not perceived. So much for the Heart, which is the lower Heaven as 'twere in this little World; the Head being the upper one, where the divine Soul hath its Throne.

Having viewed the *middle Cavity* or *Partition* of humane Bodies, and having found it to be a Structure worthy of its Creator, I should now with religious Admiration pass to the *lowest Region* of the Body, which answers to the *Earth* in the sublunary World: But because this is separated from the foregoing Region by a certain † *cross Bound* called the *Diaphragm* or *Midriff*, we ought therefore to take notice of that first. This Muscular Partition lies over-thwart the lower Part of the Breast, and is sometimes known by the Name of *Precordia*, because the Heart touches it with its Cone. Through this fleshy Skin the *Gullet* descends: And to this Part likewise the *Pericardium*, the *Liver*, *Spleen*, *Stomach* are all fastened, whence there is a Communication between them and it. The

Use

* De Generatione. † Septum transversum.

Use of this Partition is to divide the *vital* Parts from the *natural* ones, *i. e.* the *Heart* and *Lungs* from the *Stomach* and other lower Bowels; as it was fit there should be a Distance between these Parts of so great Difference in their Nature and Use; therefore this *Wall* was made between them. Again, it is useful to help the Exoneration of the Intestines, for by pressing these the *Fæces* are more easily evacuated. But its chiefest Use is for Respiration, for by contracting it self it extends the Breast, and by that Extension is *Inspiration* wrought: So by extending it self it contracts the Breast, and by that means *Expiration* is performed. Thus it is, next to the *Lungs*, (which it immediately touches as well as the *Heart*) the principal Instrument of free breathing.

And besides these Uses already mentioned, it is concluded by the most judicious Searchers into the Secrets of Nature that this Part of the Body is useful for *Laughter*, that innocent and healthful Diversion of Man's Life if it be used lawfully and moderately: For this peculiar Posture of the Countenance, with that sonorous but inarticulate Voice which attends it, is to be ascribed in great part to the shaking of the Muscles of the *Diaphragm*, caused by an Agitation of the Spirits dilating the *Heart*, and consequently this Part and the *Breast*, which being moved, affect the Muscles

of the Face, and cause this pleasant Figure of it.

Hence, * one of our learnedest Masters in Physicks gives an Account of this particular Motion of the Countenance from the peculiar Frame of the *Midriff* and the *Heart* of Man, which is different from that of all other Animals. This is the Reason why *Laughter* is proper to Man only. And the same inquisitive Person takes notice that † the intercostal Nerve is of a particular and unparallel'd Composure in Man, whence there is a wonderful Consent between the *Præcordia* and the Parts of the *Mouth* and *Face*, insomuch that as soon as Grief invades the Breast, the Face corresponds and is troubled. Hence Men, of all Creatures, only weep as well as Laugh. This we may entertain as a Truth, whatever || *Virgil* or * * *Pliny* suggest to the contrary, who tell us of weeping *Horses*. But every Moisture or Distillation from the Eyes, which is seen even in some Brutes sometimes, is not to be call'd *Tears*. † † *Homer* who tells us of weeping *Horses* ‡, mentions speaking Brutes of the same Species; he that gave them Tears could give them humane Speech. And the same ||| Poet talks of immortal *Horses* that feed on *Ambrosia* instead of Oats, or any such ordinary Provender.

* *Dr. Willis. De Anatom. Cerebri.* † *Idem. De Anim. Brut.* || *Eg.*
 * * *Lib. 8. c. 42.* † † *Il. 17.* ‡ *Il. 19.* || *Il. 5.*

vender. There is no Creature, properly speaking, *weeps* but Man, for this comes from that inward Sense and Perception which are not in irrational Animals. This must be attributed to the particular Make of their Organs: And this particular Make must be ascribed to the Will and Wisdom of the Creator, who knew this was most suitable to Humane Nature.

CHAP.

C H A P. IV.

The Frame of the third and lowest Region of the Body speaks a divine Artist. The convenient Position of the Stomach. Its wonderful Operation in the concocting of Food. The diverse Opinions of Writers concerning the Cause of it. The Author's particular Sentiments. An Account of the Intestines, and of the proper Uses of them. The several Passages and Conveyances of the Chyle. The distinct Offices of the Liver, Spleen, Pancreas. How this lower Partition of the Body is guarded and secured. The mutual and necessary Correspondence of the Brain, Heart and Stomach, which are the principal Contents of the three Regions of the Body. How by the Nerves and Animal Spirits conveyed in them all Motion and Sensation are performed in humane Bodies.

I Come now to speak of the *lower Region it self*, (which is the largest, *i. e.* the longest and broadest of the three Divisions of the Body) the *Abdomen* or *Belly*, *i. e.* all that Space in the Body which reacheth from the lowest Part of the Breast to the Fundament. Here first the *Stomach* deserves our Consideration; and that which we shall take notice of in the first Place is its Situation. By which

which I do not only mean its Position immediately under the *Diaphragm* (which without doubt is for the best) but I take notice that as the *Heart*, the most useful Part in the middle Region of the Body, is encompassed and kept safe by the *Lungs*, so this which is most considerable in the lowest *Venter* is seated between the *Liver* and the *Spleen*, That on the right, This on the left Side of it, and is kept warm by both. The former especially cherishes and comforts this Part, and that is the reason why it is placed so contiguous to it. Besides, the *Liver* and *Spleen* on both sides of the *Stomach* guard and defend it from the *Risks*. Nor is the *Pancreas* or Sweet bread a mere Expletive, to fill up the Void Places between the *Stomach*, *Liver* and *Spleen*, but is as it were a *Billow* to the former of these (as some Anatomists have call'd it) left when it is full it should be hurt by the Hardness of the *Vertebrae*. This Guard about it shews it was designed to be a Vessel of great value.

But the admirable Operation of it doth much more discover it to be so. For after it hath taken in the Food, it doth by means of that Variety of *Fibres* with which it is set about, enclose and wrap it up, and then betakes it self to *Concoction*, a most amazing Work, and such as speaks a divine Author. The toughest and hardest Meats are digested in three or four Hours Space, and turned into a soft Pap, which

which could scarcely be effected in a Pot over never so hot and fierce a Fire; and therefore the Food is not concocted by the mere *Heat* of the Stomach, as the old Philosophers thought, nor by any Heat brought to the Stomach from the Heart, as *Des Cartes* and his Followers positively determine. But whence this fermenting, acid, vellicating Juice, which is the Cause of this strange Alteration of the Meat, and turns it in so short a time into a whitish kind of Substance like to Cream, hath its Original in the Body, is not easie to tell.

We have no Assurance that this sharp corroding Humour comes from the *gastrick* and *meseraick Arteries*, as some think. Nor can we prove that it is an acid *Menstruum* derived to the Stomach from the *Spleen*, as others imagine; yea, some think there is Ground to believe the contrary, because there is no proper Vessel to promote that Commerce between them. But though herein they are mistaken, for the *Spleen* is joyned to the Stomach by a little *Meatus* call'd *Vas breve*, yet no Man can certainly tell whether there be any such sharp Liquor carried by this Passage. And 'tis known that Dogs when they have their *Spleen* cut out, are no less voracious, and concoct what they eat as soon as before. Others hold that this stomachick Ferment proceeds immediately from the *Blood*, i. e. the

the salt Humour in it: Whence melancholick and hypocondriacal Persons (who abound with this saline Liquor) have oftentimes a *Boulimy*: But there are *Objections* levelled against this by some learned Men, and they are not easily satisfied. Some think that a *Pancreatick* Juice is the great Promoter of this Work. *Riolanus* and other Moderns impute it to the four Reliques of the *Chyle* which remain in the Stomach, and are turned into a *Leven*. Dr. *Willis* refers it to a *sulphureous Acidity*, and to the *active Spirits* which issue from the *stomachick Nerves*. The *Glandules* at the bottom of the Stomach afford a certain Ferment, say others. The Heat of the adjacent *Parenchyma* the *Liver* contributes much to it, saith Dr. *Glisson*. It is from a *nitrous Principle*, say *Tilingius*, and Dr. *Mayow*: Which is in a manner the same with Dr. *Willis's* Opinion. It is an odd Notion of Dr. *Harvey*, that it is made by *Trituration*. Some have thought that the *Saliva* which is mixed with the Meat in the Mouth is the great Instrument of Concoction: Thus thinks *Diemerbroek*, and I find that Monsieur *Rohault* is one that inclines this way; but this kind of Moisture is sometimes very defective in those that have a very sharp Appetite, and digest their Meat very quickly, and therefore I can't think that this is the *Aqua-fortis* that dissolves the solideſt Food so quickly.

This

This is all that we know in the matter, and are sure of, that, *viz.* it is a most stupendous Fermentation that thus dissolves all the Parts of the Food, and turns them into that milky Subistence in so short a time. That whatever is taken into the Stomach is consumed so suddenly, is a most strange, surprizing, and prodigious thing. Any thoughtful Man will grant this. Yet I do not say this as if I questioned whether it is done by natural Means or no, for (to offer my Opinion and Sentiment in the Point) I hold that it is performed by the *particular Make and Structure* of this Part of the Body. It hath that individual Substance, Shape, Contexture and Formation whereby it is fitted for this Use, *viz.* Concoction : And the Reason why no other Vessel of the Body doth or can discharge this Office, is because it hath not Parts thus adapted. And this is the general Solution which I would give of the Operation and Function of any other Vessel in the Body, as the *Brain, Lungs, Heart, &c.* When there are Disputes about the particular Manner of their executing their Offices, I conceive the best Answer is, that all that is done, is done by a peculiar and singular Fabrication of the Parts. God hath given them a particular Turn and Form, and thereby they effect such and such things. This is signally true of that Part which I am now treating of, *viz.* the *Stomach*. And
though

though all is done here in a natural way; yet it was caused at first by a supernatural Efficient, the supreme divine Author of all things, who framed this Vessel after this particular manner, and most wisely designed and contrived the Operation and Office of it in order to the *nourishing* and *sustaining* of the whole Body.

Which will appear if we consider what becomes of the *Chyle*, that milky Juice into which the Food is here dissolved. It is sent through the * *Lower Orifice* or *Mouth* of the Stomach into the *Guts*, which are fitted and prepared on purpose to receive it, and to give it a farther and higher Digestion. Properly there is but *one Intestine*, which hath divers Names according to its divers Parts or Offices. That which immediately adheres to the Bottom of the Stomach hath its † Name from its being thought to be in its full Dimensions *twelve* Fingers in Length, though the expertest Anatomists find it not half so long. This hath no Windings, but descends straight from the *Pylorus*, that the *Chyle* may pass thence the better: And it hath a narrow Cavity that it may pass by degrees, and not all together. The next (for I will mention them all, because they have some particular Service, though not very distinctly known to us)

* *Pylorus*. † *Duodenum*.

us) is the * *hungry one*, so call'd because it is often empty, by reason of the abundance of *lacteal Veins* that are there, which suck up the Chyle. The † third is much larger than these two before mentioned, and is therefore capable of receiving more of the *Feces*, and of retaining them a longer time. Here is the *Iliack Passion*. (Note that these three first Intestines are generally known by the Name of the *small Guts* :) The || fourth is an obscure or *blind Appendix* (whence perhaps it hath its Name) of the Intestine last mentioned, and of that which I shall name next; for it rises out of the End of the one and the Entrance of the other. It hath its peculiar Use in the Reception of the Excrements, in preparing them for Ejection, in correcting the *Flatus* that proceeds from them, and in serving also as a Ligament to fasten and uphold the *Peritonaum*. The ** fifth is the largest and thickest of all, and the chief Receptacle for the *Feces*. Here is the Scene of the *Cholick Pains*, bred of Winds and Vapours which arise in this lower Region of the little World. Lastly, there is the ‡ *streight one*, so nominated because it *directly* tends to the *Anus*: And here (for there are Wonders in every Part of the Body) between the *Podex* and the *Vesica* is that so useful and excellently contrived

* *Jejunum*. † *Ileon*. || *Cecum*. ** *Colon*. ‡ *Rectum*.

ved * *Muscle*, whereby untimely Excretion is prevented and hindred; the Benefit of which cannot sufficiently be expressed. I may justly call it the *Key* of the *Postern-Gate* of the Body with which it is opened and shut as often as there is occasion, which is a thing not only of singular Use and Convenience, but of absolute Necessity.

And as for the more general Use of the *Intestines*, it is very observable and worthy of their Author: For first they were designed to retain the Nourishment a considerable time in order to its better Fermentation and Concoction: To which purpose they are made of a round, long and concave Figure, that they may be more capacious and hold the Chyle the longer time, and that they may be the fitter for Motion. Secondly, the Intention of them was to separate what is brought into them, the useful Parts from those that are of no Use. Thirdly, to convey and distribute the wholesome Portion of the Chyle into its proper Receptacle for the Nourishment of the Body. Fourthly, to expel the useless Parts and Sediment downwards. And though the other Employments be more honourable, yet this is as necessary and admirable as they. To these Ends their *peristaltick* Motion was given them, which is singular and peculiar,

E

and

* *Sphincter anūs.*

and ordained for this very purpose and no other. By this Motion (which is compared usually to that of *Earth-Worms*, which move the Parts of their Bodies successively and gradually) the pure, profitable and defecate Parts of the Chyle are separated from the Excrementitious, and the *Fæces* are by degrees depressed and carried off. That there should be this peculiar Contrivance of these Parts, and that they should have *spiral Fibres*, peculiarly fitted for the Employment they are designed to (whilst other Parts have Fibres of a quite *different* Nature) shews whose Workmanship it is. And the many *Turnings*, *Foldings* and *crooked Windings* of these Vessels were designedly framed by God for the promoting of these Ends. Hereby the Chyle hath time to digest sufficiently, and to send laudable Nourishment to the Body : Otherwise it would too soon be ejected and precipitated. If the Intestines had not these Windings, we should be always hungry, because the Meat would slip out of the Stomach too soon. Therefore, when there hath been the contrary Make of the Guts, a perpetual Appetite and Voracity have been observed, of which see Instances in *Riolan. Anthropol. l. 2.* and *Cabrol. Observat. 10.* Nature doth not perform its Work too fast, but leisurely and sedately by Help of these Meanders and anfractuous Passages of the Entrails. I have
only

from the Fabrick of Man's Body. 67

only this to observe further, that all the *Intestines* are joyned together by the *Mesentery*, that they may not be loose; and they are also fastned to the *Vertebrae* of the Back.

But because both the *Stomach* and *Intestines* were primarily intended for conveying and dispersing the useful and nutritive Part of the Food into the several Parts of the Body, I will proceed to shew you the *manner* of this particular Conveyance and Distribution, one of the greatest Arguments of the divine Contrivance of Man's Body that we can desire. The Food, *i. e.* the major Part of it being converted into *Chyle* in the Stomach, and afterwards, by the Contraction of its Fibres, detrudd down into the Guts, the more tenuious Parts of it are directly conveyed to the *lacteal Veins*, which are dispersed through the *small Guts* and the *Mesentery*. Here is the first Preparation of the chylous Matter after its Descent out of the Stomach. Then from these *milky Veins* 'tis carried to the *common Receptacle*, which is of a membranous Substance, and is placed at the Root of the *Mesentery*, and above the *Vertebrae* of the Loins, to which it is fastned (though some have lately exploded this *common Receptacle* of Pecquet :) From thence it ascends to the *Ductus Thoracicus*; and thence into the *subclavian Veins* (call'd so from the *Clavicula* or *Chanel*

Bones by which they pass) and thence it flows into the upper Trunk of the *Vena Cava*, where 'tis mixed with the Blood, and thence it runs directly into the *right Ventricle of the Heart* (in its *Diastole*) where 'tis turn'd into Blood : And thence into the *Lungs* (by the Heart's *Systole* :) Thence into the *left Ventricle of the Heart*, whence passing through the *Aorta*, or *great Artery*, it is poured into the *Arteries* of the whole Body, and thence returns again by the *Veins* : For the lesser *Veins* bring it to the *Vena Cava*, and from thence (as was said before) into the *right Ventricle of the Heart*. Or briefer thus, the prepared Chyle, which is the nutritive Part of the Food, is carried to the Heart by the *Veins*, sent about by *Arteries*, and goes back again by *Veins*. This is the Passage of it ; this is its constant Circuit.

However, though we may be mistaken in *some* of the *chyliferous* Passages, yet as to the main, the Progress is rightly stated ; and we cannot but acknowledge (as the learnedest Enquirers have done) that the Motion of this liquid Matter from one Place to another, is surprizing and amazing. The various Stages of it, its sudden mounting and climbing up, even from the *Intestines* to the *Thorax*, its making way through so many different *Channels*, is all of it divine and heavenly Mechanism. None can see and observe these things,

things, but they must be confirmed in the Belief of a God.

And now I should say something particularly of the *Liver* and *Spleen* (though I had occasion to mention them before, and observed they were a *Guard to the Stomach*, and on that account were of use :) The former of these was said, by the Ancients, to be the Blood-making Vessel, but now 'tis otherwise agreed by the learned, *viz.* that the Blood is made in the Heart. Wherefore they assign that Part other Offices, which yet are of no mean Advantage to the Body. Dr. *Glisson* is of opinion, that the *Liver* is of the Nature of a *Streiner*, *i. e.* the Blood and other Humours are defecated as they pass through it. And moreover, he thinks that it promotes the Fermentation of the Blood running through it. But those who are perswaded that no Chyle or Blood is carried to the Liver, because Anatomists do not find any Passage from the *lacteal Veins* thither, assert that the chief Employment of this Part is to separate and prepare *Choler* for the use of other Parts of the Body, and that the grosser Part of it is derived by the *Gall-Bladder* and *Biliary Passage* (which are in the hollow Part of this *Viscus*) into the Intestines to promote and facilitate the Evacuation of the Excrements out of those Parts, which are thereby rendered fluid, and so fitter for Motion : But the better and

milder Part of this Juice is sent into the Blood continually, and is very serviceable to augment its Fermentation. I will not interpose here to examine or judge which of these Opinions is most probable; but any Man of rational Thoughts will determine that a Part of the Body which is of that Bigness and Consistency that the Liver is of, was not placed there without good reason, and for some considerable End.

Then as to the *Spleen*, it was thought by the Ancients that its Employment was to separate the *melancholick* Part of the Chyle, and to contain it in its particular Cavity, (as the *Gall-Bladder* is the Receptacle of the *yellow Choler*) and after Concoction of it, to transmit some of it to the Entrails, some to the Veins, and some to the Stomach. Others lately assign other Offices of the Spleen, but cannot well agree what they are. Dr. *Glisson* will have it to be useful for the preparing of his *succus nutritius*. Others think it is serviceable for the gathering and dreining of a certain acid excrementitious Juice. But the most probable Function of it is to help and further the Ferment of the Blood, and to advance its due Concoction in the Body. It is certainly a necessary Vessel in humane Bodies, and cannot be taken out of them without real Damage to them, though some other Animals may make a shift to live without it after 'tis

but removed and the blood is not cut
reblin

cut out. Or that a Man may *live* without it, perhaps may not wholly be denied; but yet 'tis useful to the Health of the Body, for a thing may be useful though not absolutely necessary. Hear therefore what a * Person of Understanding and Judgment in these things hath said: "The great Architect, saith he, "never made any thing in our Bodies to no "purpose. What Man therefore in his right "Senses, can believe that so eminent and "large a Bowel as the *Spleen* is, should be "given in vain to Men and Beasts, without "any Necessity or Use in order to Life?

And so I doubt not but the *Pancreas* or *Sweet-bread* (which is a glandulous Substance seated under the back Part of the Stomach, at the Bottom of it, and so is, as it were, its Cushion to lean upon) is of considerable Use in the Body. It is said by some, to send a Juice to the *Stomach* in order to the Concoction. By others it is thought to afford a Liquor to the *Guts* for fermenting the Chyle there. It is concluded by others to be a *Dreyner*, viz. of some useless excrementitious Humour that passes that way. Thus Physicians and Anatomists disagree about it, some asserting one thing, some another. And here let me say this, with relation, not only to this Part, but to those immediately before

E 4

spoken

* *Isbrand de Diemerbroeck.*

spoken of, that though we have not a particular or full Knowledge of the Use of them, yet we ought not to conclude thence that they are useless. But rather as one of the Ancients said of *Heracitus's* Writings, that *what he understood of them was good, and he thence gathered that what he understood not was so too*, the like we may in a resembling manner say of the Parts of the Body, we have a full Proof concerning most of them that they are very useful, and there is reason to infer thence, that the rest are of the like Nature, though we cannot give a particular and distinct Account of them.

And now I will shut up all that I have to say concerning this last and lowest Region of the Body, when I have observed to you, that this being the only Partition that is not guarded with *Bones* (for the *Ribbs* came no farther before than the *Diaphragm*,) there is other Provision made for it, for it is in a special manner fenced and secured (though not with Bones, yet) with several other Coverings. As first, there is that Skin which is called the * *Rim* of the Belly : This covers all the Entrails, and not only defends them, but keeps them warm, and likewise keeps them together, and thereby prevents a Rupture. There is another Skin or Membrane which

* *Peritonæum*.

which wraps up the Intestines, and that is the * *Cawl* or *Kell*: This is under the *Rim*, and is not so large as that, but it is useful for the foresaid purposes, and also to keep the Bowels glib by its Fatness and Moisture, (not to speak here of its Serviceableness to *Concoction*, which might have been mentioned before, for when this Part is corrupted and defective, Digestion fails, of which see an Example in the *Philosophical Transactions*, Aug. 20. 1684. Furthermore, there is the *Mesentery* in the middle of the Entrails, which is another Tye and Security to these Parts, for it laps them close together, and holds them in their right Places, lest by the Motion of the Body they should be shaken and misplaced. Thus the Care of the Almighty is every where seen. None can observe these Parts but must confess that they were purposely framed by divine Providence.

There are *other* observable things yet behind in *this Region*, but it was not my Design to treat of all: And besides, I may, before I end this Discourse, have occasion to speak of some of them. I hope I have already, in good measure, performed the Task I undertook, *i. e.* given Proof of the Existence of a Deity or divine Intellect from the Frame of humane Bodies, by considering distinctly the
three

* *Omentum*.

three celebrated Regions of them. The *Brain*, the *Heart*, the *Stomach* are the chief Wonders of these several Apartments. The first elaborates the animal Spirits, the second commutes the Chyle into Blood, which the third had before prepared and fermented. All things in the Body depend on the mutual Correspondence of these *three*. We owe it to the Heart that the Spirits never fail in the Brain, and we are beholding to the Brain that the Motion of the Heart never ceaseth: For all that Force and Vigour which are in this latter, are communicated to it by the brisk Spirits flowing from the Head. But then again, these must be made there, and continually supplied by sending forth of Blood out of the Heart to the Brain. If one of these be interrupted, there follow *Apoplexies*, *Lethargies*, &c. If the other be suppressed, there are *Syncopes* and *Lipothymies*. And both these great Operators, the *Heart* and *Brain*, are obliged to, and even depend upon the grand Laboratory for the whole Body the *Stomach*, the Kitchen where the Food is prepared and dressed, for there can be no laudable Spirits or Blood without good Chyle and well concocted. In *these three* chiefly consists our *Life*, viz. that the Meat be prepared in the *Stomach*, that the finer and choicer Part of it be transmitted to the *Heart* and neighbouring Vessels, there to be assimilated into Blood, and lastly,

lastly, that the purest and subtilest Part of the Blood be sent and extill'd to the *Brain*, and there refined into *animal Spirits*. These, these are the Quintessence both of the Chyle and the Blood ; They are the ultimate Result of all the Concoctions, they are the Perfection of Natures Operations.

By these volatile Parts of the Blood it is that both *Motion* and *Sensation* are performed in the Body, and that after this wonderful manner, those subtile Particles which by continual Pulsation of the Heart are hurried with the Blood by the *carotidal Arteries* up into the Brain, are there by that laxe and boggy Substance imbibed and separated from the Blood, and thence are transmitted to all the Parts of the Body : Which is done by the Mediation of the *Spinal Marrow* (*i. e.* the Pith of the Back Bone, called the *Silver Cord* by *Solomon*, *Eccles.* 12. 6. and accordingly in the *Caldee*, * *chut* is *filum*, *funiculus*, and also *medulla spinæ dorsi*, because this descends like a white Thread or Cord. This I may call a *Label* descending from the Brain, and it is indeed an *Appendix* of it, or the *Brain at length.*) And the *Nerves* or *Sinews*, which are originally planted in the Brain, and the foresaid Marrow of the Back Bone, are spread through the Body on purpose to carry these fine subtile

* *Ruxt. Lex. Chald.* p. 718.

tile *Spirits* from the Brain into all the Parts; and there are *seven Pairs* or *Conjugations* of them for that Use. Because the Parts belonging to the *Head* are the most considerable, there are therefore six of these Pairs appropriated to them. One Couple constitutes the *optick Nerves*, another appertains to the *Muscles* of these Parts, a third is proper to the *Ears*, and three Couples go to the *Tongue*, and its adjacent Parts. The remaining Pair is divided into several small Nerves that are inserted into the *Lungs*, *Stomach*, and other Parts belonging to the second and third Ventricle. *Bartholine* assigns *three Pair* more which have their Rise also within the *Cranium*. And he (as well as the *Ancients*) reckons *thirty Pair* that proceed from that Part of the *Medulla* which is in the *Vertebrae*, and are distributed over the whole Body.

These, and the whole *genus nervosum* (though they are useful for the *fastning* and *linking* of the Parts of the Body together, which is no inconsiderable Use of them) are more especially designed to be the Organs of Motion; for this is caused by those active *Spirits* (before mentioned) in these *Nerves*, in concurrence always with the *Muscles*, which are purposely framed for the promoting of it. For into these are inserted the *Nerves*, which are the proper Vehicles of the *Animal Spirits*, and bring them from the Brain

Brain hither, and thereby produce *Motion*: For the Muscle swells by an Influx of those Spirits into it, and so moves the Part or Member. This Action of the *Muscles* is performed, not only by the *Nerves*, but the *Fibres* and *Tendons*, which are of most exquisite Contexture, insomuch that an * English Philosopher avoucheth, that *in the Muscles there seems to be more Geometry than in all the artificial Engins in the World.* All the Motion of the Body depends on these, which are so set one against another, that when one is contracted, it draws with it that Part of the Body which it is joyned to, so that the opposite Muscle at the same time is extended: And at another time, if this Muscle be contracted, the other necessarily is shrunk up and draws to it the Part that is annexed. And the only reason why this Muscle is thus affected rather than that which is opposed to it is, because the same Quantity of *Spirits* flows not from the Brain to one that doth to the other. The short then is, that a Gale, a Current, a Blast of *Animal Spirits*, is the Spring of all voluntary *Motion* and *Progression*; for though the Limbs are moved by the *Muscles* which slip up and down) and these by the *Nerves*, yet both are originally moved by those *agile Spirits*.

And

* Mr. Ray's Wisdom of God in the Creation.

And *Sensation* (as well as *Motion*) is performed by these, for the *feeling Power* is then exerted when the Threads of the *Nerves*, by occasion of the sensible Objects which make some Vibration on them, affect the Brain. To which purpose these Strings are spread over all the Body, so that whenever any Object touches them, either mediately or immediately, the Brain presently discerns it, just as a Spider feels the shaking of her Web, if any Thread of it be touched. Thus the *Nerves* and the *Spirits* in them (which are continually diffused) are the Cause and Principle of all *Sense*. This is the Reason which perswades me to believe that the *Brain* (the chief and principal Part of all the Body) is the Seat of the *Soul*. For where should we fix its Throne, but in that Place where there is the original of all *Sense* and *Motion*? And this is the *Brain*, which (as you have heard) is the Source of all the *Nerves*, and all *Spirits* conveyed in them and to them. Here then this great Queen resides as in her Palace, and these pure refined Particles are her immediate Instruments in all her Functions, and particularly they are the Means of *Sense* and *Motion*. Wherefore we may infer (as an * ingenious Observer doth) “ That the Fabrick
“ of our Bodies was made in Subserviency to
“ the

* Dr. Power.

“the *Animal Spirits*, for the Extraction, Separation and Depuration of which all the Parts of the Body were contrived and designed : As the Chymical Laboratory and all its Furnaces, Crucibles, Stills, Retorts, Cucurbits, &c. were made by the Artist for the making of his *Spirits* and *Quintessences*. And this is as much as if he had said, All was made for the *Soul*, for this acts wholly by these *Spirits*, and can do nothing without them. And 'tis likely that there is a secret Parcel of these which are the *Soul's Vehicle*, and whilst the other *Spirits* (as well as the Blood) circulate in the Body, a certain Number of these remain in the Brain: Or if they shift Place, and circle with the rest, the *Soul* supplies it self with fresh *Spirits*.

However, this is evident and unquestionable, that the *Soul* acts in the Body by Mediation of these *Animal Spirits*, which are dispatched over all the Body by the *Nerves*. And though we feel Pain or Ease in the most extreme Parts of our Bodies, yet the Sensation is in the Brain properly. Therefore * *Dr. Willis* ranks the *Gout*, which infests the Feet, among the Diseases of the *Head*, because the Pain is felt by the *Nerves* which are seated in the Head. And upon this Ground we may most philosophically assert, that in the Brain
are

* *De Scorbuto.*

are situated all the *five Senses*, and that all the Senses are *feeling* or *touching*, because they are all exerted by Help of the *Nerves*, which are originally seated in the Brain. By the Spirits which are communicated to these, the Soul affects the Body, *i. e.* moves it and makes it sensible. When these are dissipated and diminished, the Body becomes languid and weary: When they are intercepted, it is stupid and senseless: When they are wholly stifled, it becomes dead. And all this depends upon what had been said before concerning the Communication which is between the *Heart* and the *Brain*; that is, the former sends Arterial Blood to make these *Spirits* in the latter, and this latter returns this Kindness to the former, by transmitting those Spirits to it, whereby it is enabled to thrust the Blood contained in it, into the Arteries, and so it doth it self a Kindness at the same time. The serious Consideration of this Friendly Reciprocation of Motion between these *two*, cannot be enough admired: and the Contemplation of this and all the rest which hath been said on this Subject, cannot but infuse into us a firm Belief of a God-head, who hath thus wonderfully constituted the Body, and hath rendred himself adorable from the Consideration of those many Excellencies which he hath furnished it with.

C H A P. V.

The several Kinds of Flesh, and how exactly fitted and placed in the Body according to their several Uses and Purposes. Why the hinder Part of the Cranium is so strong and thick. The admirable Conformation and Contrivance of the Vertebrae of the Neck and Back. The particular Structure of the Hip-Bones. The Nature and Use of the Ribs. How smiting under the fifth Rib, 2 Sam. 2. 23. is to be understood. The peculiar Configuration of the Bones of the Hands. The general Use of the Bones, together with the Marrow of the whole Body. They are numerous. The Nature and Serviceableness of the Gristles. A distinct Enumeration of the several Sinks and Dreins which are made to carry off excrementitious Humours. What is the immediate Matter of the Seed. What of the Milk. The Author interposes his Opinion. The Lymphatick Vessels. The Pores of the Skin.

THere are some other things worth our notice; which, because they were not properly reducible to any one Region or Venter (some of them belonging, partly to one, and partly to another, and some appertaining to all) I have left them to be spoken of in this

F Place.

Place. I will therefore add a few Remarks concerning the *Flesh*, and the *Bones*, and the several *Drains* of the Body, all which we shall find to be undeniable Testimonies of the singular Care and Goodness of God in framing our Bodies. First, It is not unworthy of Consideration, that there is a fourfold Sort of Flesh.

1. That which is *Musculous*, and is most properly *Flesh*. This being solid and nervous, is made use of to cloth the Bones, and to guard and secure the internal Parts. This is a Fence to keep them from being exposed to Danger. And being flexible and soft, is further serviceable to shape the Limbs and Members, and give them a Proportion and Comeliness. It was given to plump and fill up the Skin, and thereby to adorn and beautifie the Body: And especially, to prevent or cure the Disorders of a Meager Countenance, an Hippocratick Face. And it is not only for Ornament, but Ease and Repose. This is a soft Bed of it self, and makes Discumbiture a delightful Posture, and conciliates Rest and Sleep. And in the Day-time, as well as in the Night, it is commodious and easie, because it facilitates our Sitting. Where, by the way, I could observe that the hinder Parts of Man's Body, which are for *sitting*, are covered with this Sort of Flesh more than any other Part of the Body, and more than the like

like Parts are in any other Animals whatsoever: Which was designedly done without doubt, because these Parts are fitted for the Posture of *sitting*, which no other Creatures are capable of in that way. It is Man only that *sitteth*, i. e. resteth his Body upon the *Ischias*: Beasts having *four Legs*, can stand upon them the better, and so support their Bodies a long time without being wearied: But Man wanting these Supporters, requires Rest, and these Parts are excellently fitted for this end, i. e. they are round, fleshy, and very prominent, that they may be the fitter Cushion for the Body. The God of Nature hath herein provided for our Ease.

2. There is another sort of Flesh, called *Parenchyma*: Though 'tis but improperly said to be *Flesh*, because it hath no *Muscles*. Yet this *Viscerose* sort of Flesh is most suitable (which is the thing I would observe) to those Vessels and Parts of the Body which are composed of it, as the *Lungs*, the *Liver*, *Spleen*, *Reins*. It is a Substance proper to these and no other Parts, by reason of its Laxness.

3. A *Membranous* Flesh, or fleshy Skin, which is as agreeable to its Kind as the rest are, it being adapted to a particular Use and Service in the Body, which no other sort of fleshy Substance could fit, because being clammy and glutinous, and sticking close, it is a suitable

able Covering to wrap up other Parts of the Body in. Of this therefore are composed the *Coats of the Eye*, the *Gullet*, the *Guts*, the *Bladder*, the *Pleura* or inward Lining of the *Ribs*, the *Pericardium*, *Peritoneum*, *Amnios* and *Chorion*.

4. *Glandulous* Flesh, which is slippery and porous, on both which accounts it is fit for the purposes it is made use of in the Body, *viz.* to move with Ease, to imbibe excrementitious Liquors, and to transmit them: Of this sort are the *Kernels* about the *Throat*, *Paps*, *Arm-holes*, the *Groin*, &c. Thus this Variety of *Carnous* Substances in the Body is according to the different Use of them, which establishes yet further the Notion of a Deity, a wise and provident Creator who suits all things in the lesser, as well as in the greater World to their proper Ends and Uses: And it is a Demonstration that Humane Bodies have plain Impresses of Divine Wisdom upon them.

As to the *Bones*, they likewise are a worthy Subject to treat of: For, as the Philosopher of old said in another Case, *Et hic Dii sunt*, here (as in other Parts of the Body) the divine Workmanship is seen, it is evident that *God* is here, *i. e.* The Heavenly Power and Wisdom are plainly discernible in the Fabrick of these Parts. I intend not to expatiate here by transcribing the common
Trea-

Treatises of *Anatomy*, and giving you a particular Account of the *whole Compages* of the *Bones*, but I will only give a Glance on some few of them. I have already mentioned the *Bony Cap* which is the outward Cover of the Brain, and is, as 'twere, stitched together by its *Sutures* of different Forms : only here let me observe this, that because the * *hinder Part of the Brain*, where the Animal Spirits are bred, is of the greatest Use, and is the chief Source and Original of the Nerves, therefore the Heavenly Architect hath made the *back Part of the Skull* harder and stronger than the other Parts of it, either that before, or on the Top, or those on the Sides. And there was another Reason why this hinder Part of the *Cranium* should be thicker and stronger than the rest, because this is otherwise unfenced against Casualties : For if a Man falls upon his Head backwards, there is nothing to help and defend him ; wherefore this Part is fortified by Nature.

In the next place I will take notice of the commodious *Vertebræ* of the *Neck*, which are a great many little *Bones* set together in such a manner that the Neck may *turn* or *bend* this or that way with Ease, whence, without doubt, they had their Denomination. Moreover, it was with Wisdom contrived,

F 3

that

that the *Medulla of the Brain* being lengthned out, should be securely conveyed from the Head through this Guard of *turning Bones* into those of the *Back* (to which it is joyned,) which were made to be a larger Case to hold the *prolonged Brain*, or now I may call it the *Brains of the Back*. This *Spina* (call'd so perhaps because its back Part is set with many little ragged sharp Bones like *Thorns*, but 'tis vulgarly call'd the *Chine*, which it may be, is a gross Corruption of *Spine*) is so marvelously placed and framed by the divine Disposer, that it is the most able and substantial (as well as the greatest) Supporter of the whole bodily Structure. The Composure of it is admirably advantagious, because it is not one Bone (for then it would have been inflexible) but it is a Ridg of Bones from the Head to the Hips, and consists of no leſt than 24 *Vertebræ*, which are made to bend, ſo that a Man may conveniently ſtoop when there is occaſion. Again, this long Ledge of Bones is framed with continued *Interſtices* and *Aper- tures*, out of which all the *Nerves*, with their en- cloſed *Spirits* proceed, and are ſpread into the ſeveral Parts of the Body for the ſtrengthening and nourishing of it: Whence (as I conceive) when theſe *Vertebræ* are out of order and diſplaced, as in thoſe Bodies that are crooked the Strength and Growth are impeded. The *Rickets* (a Diſeaſe of Children, and if we

from the Fabrick of Man's Body. 87

we may credit * *Dr. Skinner* known in the *British Isles* only, and in no other Part of the World) hath its Denomination from this Part (for *ῥάχις* is *spina dorſi*) becauſe it is the chief Scene of this Diſtemper, as our *Dr. Glifſon* determines.

Toward the lower and further Part of theſe *Vertebrae* are placed the *Hip* or † *Huckle Bones*, which are two thick maſſy Bones that are faſtned to the *Os ſacrum* on both ſides of it: And there is in theſe a moſt remarkable || *Pan* or *Cavity* where theſe are joyned together, and into which the Head of the *Thigh-bone* is inſerted, and therefore is called the *Hollow of the Thigh*, *Gen. 32. 25.* (which the Angel forcibly put out of joint when he wreſtled with *Jacob*.) Skilful and obſerving Anatomifts ſpeak very great things concerning the peculiar Fabrication of theſe Bones, concerning the ſtrange Commiſſures and Junctures of them, the admirable locking of them in, that they may be both ſtrong and uſeful. The Bones of the *Thighs*, *Legs* and *Feet* ſupport the other Bones which are above them, and therefore may juſtly be reckoned the *Baſis*, the moveable Foundation of this Human Build.

F 4

Build.

* *Onomatol. in verbo Rickets.* † *Coxendices.* || *Acetabulum* is the Latin Word. By the Greeks 'tis called *κοτύλη* & *κοτύλη-δών*, *ὅν ᾧ ἐπέφαιε ὁ μὲνός*, in which the Hip-Bone is turned, *Aristot. Hiſt. Animal. l. 1. c. 13.* The Hebrews call it *Caph*, *Gen. 32. 25.*

88 *God's Being, &c. proved*

Building, and accordingly a singular and inconceivable Care is taken in the fashioning of them, witness about 30 Bones in one Foot.

The *Ribs*, those crooked Bones which are the Limits and Boundaries of the *Thorax* on the Sides of it, are next to be mentioned. They were designed by the Heavenly Artificer to be a Fence to this noble Region of the Body, and the *Viscera* of it, viz. the *Heart* and *Lungs* : And the convex Figure and Flexure of them are not a little conducive to the Safety of those Parts which they environ. And perhaps, that is the moral Intent of * the *Woman's being made of the Man's Rib*, that she should be, in her Capacity, a Safe-guard and Protection to her Husband, according to that primitive and emphatick Epithet of a *Wife* (*Gen. 2. 18.*) חַיִּי, *Bonae*, as the *LXX* render it, and according to the *V. Lat.* *adjutorium* : And *Pagnin* and *Buxtorf* translate it *Adjuvamen, Auxilium*; which is suitable to that excellent Character of a married Woman, *Prov. 3. 11, 12.* *The Heart of her Husband doth safely trust in her, so that he shall have no Need of Spoil, i. e. of Riches violently got. She will do him good and not evil all the Days of her Life.* All Men and Women have 24 *Ribs*, 12 on one side, and 12 on the other.

* *Gen. 2. 22.*

other. There are on each side *seven greater ones* (and they are *uppermost*, and known by the Name of *Legitimate*) which are all joyned to the * *Breast-Bone*. The other *five lesser* (which are situated below these, and are called *spurious*) are shorter on both sides, and do not reach so far as the middle of the Breast.

Perhaps *smiting under the fifth Rib* (or *in or about the fifth Rib*, for the Præposition *el* is of a large Signification, as the learned know) which is mentioned in † the old Testament, may signifie that Place in the Body which is under or near the *last* of these *spurious Ribs*, *viz.* the *fifth*, that broad Place which reacheth as far as the Bottom of the Belly, and lies open to any Blow, because it is not defended with *Bones*, the reason of which is, because this Part of the Body admits not of it, there happening such a different and unequal Distension of the Stomach and Intestines, according to the different times of eating or not eating. And other weighty Reasons there are which have particular respect to the Sexes, and may better be conceived than expressed. And that this is the true Acception of the *fifth Rib* I gather from 2 *Sam.* 20. 10. where 'tis said, *Joab smote Amasa in the fifth Rib*, and immediately 'tis added in the next Clause,
and

* *Sternum.* † 2 *Sam.* 2. 23. 3. 27. 4. 6. 20. 10.

and he shed out his Bowels to the Ground. *Megni*, the Hebrew Word here used, may relate to the *Viscera* or *Intestines* of the lower Belly; and especially the Word *Shaphak*, to pour forth, intimates that *Megni* is meant of these, for the *Effusion* of the Bowels is properly meant of the *Guts*, which are wont to gush forth when there is an Incision made, as here in the present Case by a Sword. This Part under the *Short Ribs* (which were five,) just above the Belly, is the most eligible Place for such a Purpose, for here are no Ribs or any other Bones to resist or put by the Stroke: And besides, it is probable the *Breast-Plate* or *Armour* reached generally no farther than hither. This makes me inclinable to think, that this and the other Places are to be interpreted concerning the *fifth lesser Rib*, and not the *fifth superior one* (as some Expositors understand the Words) under which Place the *Heart* is situated, but is not so easily come at.

I could mention also the wonderful Multiplicity of the *Bones* of the *Hands*, those noted Instruments of Action. There are no less than 32 of them in one of these Members: And the Variety of them as to Figure, Size and Make is equally remarkable: For this great and marvellous Diversity of them is wholly in order to the divers Uses of this excellent Limb. By that various shaping, placing,

placing, ordering and joyning together of so many little Bones in this Part of the Body it is fitted for those Ends which it was made for. Hereby it is able to *bend* and *turn it self* as there is occasion, whence among the Hebrews the Hand is called *ekeph*, from *akaph*, *incurvavit*, *flexit*. Hereby it is capable, not only to feel and handle, but to lay hold on things; yea, hereby it is fitted for the most useful Services of Man's Life, as Building, Husbandry, Chirurgery (which hath its Name thence) Military Actions, Writing, Painting, Engraving, Playing on Musical Instruments, and all or most of the necessary, as well as the recreative Arts and Employments of Human Life. Therefore some Criticks have thought that the *Latin Manus* comes from the *Chaldee*, *Man an Instrument*, because it is so serviceable and useful, and is what the great Philosopher calls it ὄργανον ὀργάνων. He tells us, and very truly, that the *Hands* of Men are Arguments of their being the most sagacious and understanding Creatures that were made, for these (* saith he) are *Instruments* whereby we take things, and with these we make use of other *Instruments*: And 'tis a sign that Man is capable of many Arts, and can use many *Instruments* to act with, that God hath given him *Hands*, which are the most useful *Instruments* of themselves.

* *Aristot. de partib. animal. l. 4. c. 10.*

selves. Hence it is, that *Man*, of all Creatures only, hath *Hands*. * *Galen* talks after the same rate, concluding *Men* to be the wisest of all *Animals*, because they have this noble Part bestowed upon them. It is well known that this ancient Physician, who was of famed Learning and Skill, (though of pagan Principles) was induced to acknowledge an infinite wise Disposer and Manager of all things from the very consideration of the admirable Make of *these Parts*, and he breaks out into a *Hymn* upon that Occasion, of which I may speak something afterwards.

Yet, after all that he and others have suggested concerning the Usefulness of this Organ, this must be said, that, as artificially as it is framed, it would be of little Use if the *Fingers* of it were not armed with *Nails*: For these are necessary for preserving that fleshy Part where they are placed, which is exceeding tender: They are useful for strengthening the Parts themselves in their Work, for making them capable of handling and dealing with hard and solid things, and for many particular Services which this Organ was made for. So that the very *Nails* of our *Fingers* point to a *God*.

And

* *De usu part. l. 1. c. 1.*

And as to the *Bones in general*, this we are to observe, from another ancient and famous Inspector into Human Bodies, that these Parts * give a *Steadiness*, a *Rectitude*, and a *Shape* to the Body: They were more especially made to *strengthen* and *confirm* the Corporeal Fabrick, and therefore are more solid and substantial than any other Parts. Not to attend to the † *Talmudick* Fancy about the little Bone *Luz* (as they call it) at the end of the *Spina dorsa*, that never putrifies when all the rest do in the Grave; by virtue of which incorruptible Bone the whole Body shall be restored and rise again: Not to listen, I say, to such fantastick Dreams, this we are assured of, that the *Bones* are of a very firm and solid Nature, and 'tis certain that they last a long time, as hath been seen in Graves and Sepulchres. This Solidity of them is intimated to us in the Hebrew Tongue, where *Gnetsem, os*, is from *Gnat sam, roboravit*: And this Noun *Gnetsem* is sometimes *Robur*, *Substantia*. Wherefore both || *Jews* and * * *Arabians* express *Decay* and *Weakness* by *breaking* and *masting* the *Bones*, and the contrary, by their † † *flourishing*.

And

* Τῶ σώματι σάσειν, καὶ ὀστέονησιν καὶ ἰσθμὸν παρέχοντα. Hippocrat. lib. de Off. nat. † Beresh Rab. || Psal. 6. 2. 22. 14. Lam. 3. 4. Jer. 50. 17. * * Job 33. 19. † † Job 21. 24. Psal. 51. 8. Prov. 3. 8. 15. 30.

And besides, the Firmness which these Parts have of themselves, there is an Addition to it by that *strong Connection, Conjunction* or *Articulation* of them, which all anatomick Observers speak of with Admiration: And which the Roman Philosopher and Orator long since took notice of, telling us *that* * *their Joyntings and Closures are wonderful, that they are purposely made for the Stedfastness of the Body, that they are fitted to be the Boundaries of the several Limbs, and that they are exactly accommodated to the Motions and Actions of the whole.*

Again, the Marrow of the Bones, which is included in the larger Cavities of the greater ones, and in the obscurer Passages of those that are lesser, is of singular Use, for (as we are told by a † learned and religious Physician) this keeps the Bones moist: If they were not, saith he, furnished with this unctuous Humour, they would grow dry and brittle, and soon crack and break. And further, the Joynts of the Bones, by this Moisture, are made glib and slippery: This Oyl is useful to supple them and the Ligaments, and thereby conduceth to the Easiness of Motion.

I

* *Mirabiles commissuras habent, & ad Stabilitatem aptas, & ad artus finiendos accommodatas, & ad motum & omnem corporis actionem.* Cic. de nat. Deor. l. 2. † Dr. Willis, de Scorbute.

I will not here enlarge on the peculiar Rarities which an * ingenious Person hath lately discovered in the *particular Structure* of the Bones, as the several *Plates* of which they consist, lying one over another, their *superficial Cavities*, their *Blood-Vessels*, &c. all which have their special Uses and Ends. That which is most obvious, and which none can doubt of is, that the *Bones* were made by the all-wise Being to sustain and support, to fasten and corroborate the whole Body. And that they might do this the more effectually, their *Number* is very great: There are in Human Bodies, if we reckon great and little, moveable and immoveable Bones, no fewer of them than 248 according to *Hippocrates* and *Galen's* Arithmetick. And it seems this very Number was receiv'd among the *Jews*, for their *Rabins* aver, that there are 248 *affirmative Precepts* in the Law, just so many (say they) as there are *Bones* in the Body of Man. *Riolanus* will have us bate one of this Number, but *Albertus magnus* adds considerably to it, and reckons 276. some have fancifully reduced them to the Number of the Days in the Year. But I find that the most skillful *Anatomists* of late count above three hundred.

Leaving

* C. *Havers*, M. D.

Leaving others to compute the precise Number of them ; we are certain of this, that it is very considerable, and that they were all designed to render the Body more stable, firm and steady. These are the *Posts* and *Studs*, or rather these are the *Pillars* of this *House of our Bodies* : These are Props and Supports of our fleshy Tabernacle : These are the Upholders and Sustainers of this Corporeal Building. And that this was the main End of them appears from this, that most *Fishes*, because they live in another sort of Element which is soft and liquid, and hath no Resistances made to it at any time, have no Parts of such hard Substance as *Bones*, properly so called, but rather *Cartilages* or *Griftles*, which are more convenient and proper for the Use of that sort of Animals, which still convinces us of the universal Wisdom and Providence of God towards all his Creatures.

And further, as to this *Cartilagineous* Substance which I last mentioned, we may take notice how fitly it is made use of in Human Bodies, that is, in those Parts where it is most useful. Thus because it is serviceable for shaping and fashioning those Places which are hollow, or which have a Prominency above the rest, we see that the *Ears*, the *Nose*, the *Larynx*, *Epiglottis*, &c. are made of it : For this is not so stiff and hard as Bone, but

but gives way, and therefore is not easily broken or hurt. Because it is an useful *Medium* for uniting of hard and soft Parts together (it being it self of a middle Nature between them) we continually find it among the *Joints* and the *Articulations* of the Members and Limbs. We may observe that the *Ribs* are at both Ends of them tipp'd with this: And the *Breast-bone* it self, to which the greatest Part of the *Ribs* are joyned, hath a Mixture of this Substance. Yea, the lower Part of it, which reaches to the *Diaphragm*, and the *Mouth of the Stomach*, and defends them, is a perfect *Cartilage* of a *Sword-fashion* (whence it hath its * Name,) i. e. it is sharp and pointed at the End like that Weapon. If some great *Comard* should chance to read this, perhaps it will make him tremble to think that there is a *Sword* or *Dagger* so near his Heart.

To proceed, it was necessary that the Body which is daily contracting superfluous and noxious Humours, should have some Vessels and Channells on purpose to drain them away. And accordingly the divine Wisdom, when it erected this House of Flesh, made several *Sinks* and *Drains* to carry these off, and thereby to purge and clear the Body. And yet

G

this

* *Ensisformis*.

this must be said, that *some* of them serve not chiefly to this End, but only by the by, as may be gathered from what was said when I had occasion to speak of them before. The *Nostrils* are for the Evacuation of a particular *pituitous Excrement* that flows from the Brain. The *Palate* and *Mouth* are for receiving and ejecting the *Spittle*: Though here I make a Difference between the *insipid Spittle* (I mean that superfluous and viscid Humour which troubles the Mouth, and is useless, and proceeds from Catarrhs and Corruption of the *Saliva*) and the *Saliva it self* which properly is not an Excrement, for 'tis of great Use. It moistens the Jaws and *Oesophagus*, and the Organs of Speech, and makes them slippery, and thereby serviceable: It is useful to quench the Thirst, it mixes it self with the Food when it is masticated, and by its Moisture fetches out the *Sapor* of it: This Salival Humour promotes and facilitates the swallowing down of the Meat, and it is a necessary Preparation, and an initial Fermentation in Order to Concoction. In the *Eyes* the *Carunculae lachrymales* are for the *serous* Defluxion of *Tears* which come from the Arteries of the Head into these Places. And as *Weeping* is contrary to *Laughter*, so it is produced in a contrary way, for it is caused by the Compression and contracting of the Vessels, as the
other

other by the Dilatation of them. The *Ears* are the Evacuators of the *bilious Excrement* that flows thither. That learned Person whom I have so often mentioned, is of opinion, that the *Lungs* are the grand *Emunctory* of the Body: And * he promises to prove, by several Experiments, that there passes out of the Body a greater Quantity of fluid matter this way (*i. e.* upwards, and through the *Lungs*) than there doth of Urine by the *Kidneys*, downwards. The *Gall-Bladder* in the hollow Part of the Liver, is the Dreiner for *Choler*, and the *Spleen* is the proper Sink for *Melancholy* or black *Choler*.

The *Reins* or *Kidnies* are for the Reception and Excretion of the *Urine*, the watry Part of the Meat and Drink, which is conveyed to them together with the Blood from the *emulgent Arteries*, but is here separated from the Blood, and then conveyed from these Parts to the *Ureters*, and thence to the *Bladder*, which is of singular Use to receive, contain and hold it till it be replenished, and then it dischargeth it by the *Urinary Passage*. Though truly there may be some doubt whether *all the Urine* be an Excrement of the *Blood*: For it may be conceived improbable, that all the Liquor a Man drinks, goes
G 2 through

* Nat. Hist. of the Earth. Part 4.

through his Heart. If he takes down Mineral Waters in great abundance, he evacuates them so speedily, that one can scarcely imagine that they went about that way. And when he drinks vast Quantities of the strongest and hottest Wines, one would think there should be a greater Inflammation and Commotion in that Part, *viz.* by a mighty Increase of the Quantity of the Blood, than is usually felt. This may prompt us to believe that Liquor hath some other way to the Reins, that some of it goes into the Blood, and that other Parts of it go more directly to the Reins by some Passage which is not yet discovered. The Use also of the *Glandules* or *Kernels*, which are dispersed up and down the Body, is to separate and strain the *Phlegmatick* Humours: For though 'tis probable that some of them (as Dr. *Glisson* hath observed) are for Nutrition (as the *Thymus* or great Glandule of the *Thorax*, the Glandules of the *Mesentery*) yet 'tis not to be questioned that others, and those the greatest Part, are for Secretion. Such is the *Pituitary Glandule* in the Brain, which receives the superfluous Humours, and conveys them to the Palate, Nostrils, &c. Such are the Kernels behind the Ears, and those about the Throat and Jaws (called both by the Learned and Vulgar * *the Almonds*

* *Amygdalæ faucium. Plin. Tonsillæ.*

monds of the Ears, because they resemble them in Figure,) the Kernels under the Armpits, &c. also the Seminal Kernels, and more especially, the *Prostata*, which are proper Emunctories for the Seed, which is produced from a Part of the arterious Blood which is brought from the Heart, out of the *Arteria magna*, through the *spermatick Arteries* into the *Parastata*, and there prepared. Some hold that it is made wholly in these Vessels ; but it is denied by others, who assert that 'tis the proper Office of the *Testicles*. The middle Opinion seems to be truest, *viz.* that this feminary Matter is elaborated and made in these, and thence flows into the *Parastata*, which further prepare it by a particular Secretion. Some have thought that this is not the Product of the Blood, but of the *Succus Nutritivus* which is carried in the *Nerves*, and is derived from the Brain and Spinal Marrow : And others reckon it to be a *lacteous* Excrement. But still it is granted by these dissenting Parties that the *Glandules* before mentioned are made use of for the separating or preparing of this *seminal Liquor*.

There are also the * *Glandules* belonging to the *Paps*, where Milk is made of the Blood

G 3

which

* *Glandule Mamillares.*

which is sent from the Heart by the Arteries into these Parts, for the nourishing of young ones. Though 'tis true, others are of opinion that this *lacteous Excrement* is not blanched Blood, but Part of the Chyle conveyed to the Breasts: But from what I shall immediately suggest, it will plainly appear that the old Opinion is the most rational and eligible That of *Plutarch* is undeniable, that * the admirable Confection and dispensing of *Milk* are sufficient to demonstrate a Providence, and a divine Sollicitude and Concern for Mankind. Who can be an Atheist, *i. e.* deny an intelligent and provident Disposer of the World, who observes that in the time of the Pregnancy of Women, that Blood which had another Chancel before, is now directed to nourish the *Fœtus*, and as soon as the Time of Gestation is over, *i. e.* as soon as the Infant is born, the Passage of the Nourishment is again on a sudden changed, and it finds its way to the Breasts and Paps for Nutrition of the Infant? the Pores of the *Glandules*, which we are speaking of, being then fitted to receive and alter the Blood conveyed to them; which, as soon as it ascends thither, is turned into that white Juice called *Milk*. This seems to
be

* Ἀρχαὶ δὲ ἡ τῆς γάλακτος ἐργασία καὶ οἰκονομία τὴν προνοίαν ἐμφάνει καὶ ἐπιμέλειαν. De amore prolis.

be a clear Evidence of the Truth of the ancient Doctrin, that *Milk* is the more immediate Product of *Blood*. But yet I do not say this to exclude the Modern Opinion wholly, for in some Persons perhaps (who exceedingly abound with Blood) and at some times (when the Vessels are more peculiarly adapted and qualified) the *lacteous Liquor* may be made both ways. I take leave thus to interpose in the Controversie, and to compromise it, because I observe that Nature delights to vary in her Operations, and to do her Work more ways than one. I only here add, that *Milk* is of a peculiar Substance, or rather contains three kinds of liquid Substance in it, *serous, creamy, caseous*, and hath a great nutritive Vertue in it, and consequently, is not properly an *Excrement*, though it be reckoned to be such by Physicians in the laxer way of speaking. And so is that *other* which I last mentioned; but in a strict Sense they are both of them above the Nature of *Excrements*, i. e. superfluous and useless Humours of the Body: For the one is for Procreation, the other for Nourishing the Fruit of the Womb.

Next, some late Anatomists tell us of certain * *Pellucid Vessels* which carry a limpid Li-
G 4 quor

* *Vasa lymphatica.*

quor in them, and perhaps have their Rise out of the *Glandules* (of which I spoke before) that are every where dispersed about the Body. *Bartholine*, the first Discoverer of them, thought they were designed to convey that thin transparent Liquor to the Chyle-bearing Vessels; and some have believed them to be spread up and down every where to moisten and cool the Body: But (as I have suggested before, that there are several Uses of the same Parts) these *lymphatick Vessels* may be likewise intended to be Receptacles of superfluous serous Excrements, and to be of the Nature of common Sewers to the Body.

Besides all these, there are the *Pores of the Skin*, which are universal Emunctories for Sweat and Perspiration. The Skin is a kind of *Net-work*, as the excellent *Malpighius* represents it, who often view'd it in a Microscope, and tells us that it appears in the Form of a Net, full of Holes, by means of which our Bodies are perspirable. Perpetual Exhalations and Steams issue forth thence from the Mass of Blood, and thereby ill and offensive Humours are thrown off and evacuated, which, if they were kept in, would be very destructive to the Body, and become the Fuel of most Diseases. Or if this be not performed with Freedom and Ease, *Diaphoreticks* are seasonable to pro-

provoke this Evaporation ; which could not be done unless there were these little invisible Passages in the Skin, these Eyelet-holes and Perforations, as 'twere, all over it. * *Sanctorius* was the first that found out the exact Weight of insensible Transpirations, and made and used a *weighing Chair* for that purpose. He first discovered that more than half of what we eat and drink exhales by these imperceptible Emanations. These vaporous Excrements, though not seen, exceed in abundance all the other sensible Excretions and Purgations which I have been speaking of.

Lastly, The *Intestines*, and the various *Foldings* of them are, and were designed to be Vents and Evacuatories for the grosser and more offensive Excrements, which are separated from the alimential Parts of the Chyle, and are thrust out of the Body by Siege : Which, as sordid as it seems to be, is as necessary for the Welfare, yea, I may add, the Being of Mankind as any of the Offices and Functions of the Body that have been named in this Discourse. Thus you see, how by these divers *Sinks* and *Conveyances*, the useless Parts are carried off, the ill Humours are separated and drained, more especially, the
Blood

* *De med. Stat.*

Blood is percolated and refined, and the whole Body is scoured, cleared, and purified. This cannot be the Result of Chance, but argues Design and Contrivance. It was a divine Director that disposed the several excrementitious *Fæces* into their proper and peculiar Receptacles, in order to the good Plight and Health of the Body. Thus in every Part of this Humane Structure the Footsteps of divine Wisdom may be discovered.

C H A P. VI.

The wonderful Formation of the Foetus in the Womb is an irrefragable Argument of the divine Wisdom and Power. It is so acknowledged by David, Solomon, Hippocrates, Harvey, Glisson. Whether the Child, all the time of its close Confinement, be nourished with Blood or Chyle, by the Navel or by the Mouth. As its living in the Womb, so its safe coming forth thence is the effect of a divine Conduct and Providence. The secret Parts are Proofs of a wise and intelligent Creator. A Reflection on the whole. The Body of Man a Temple. The great Variety of Workmanship in this Structure. St. Paul speaks like a natural Philosopher. Every thing in humane Bodies shews wise Forecast and Design. Tho' some of the Hypotheses proceeded on in this Part of the Discourse, should prove faulty, yet the very things themselves will always remain Arguments of the divine Wisdom, Power and Goodness. The exact Symmetry of Man's Body proved by several learned Writers. The Exquisiteness of this Fabrick is made use of as an Argument for the Demonstration of a Deity by David, Job (whose observable Words are paraphrased upon,) Isaiah, the great Apostle, the Christian Fathers, Learned Jews, Gentile Philosophers and Physicians,

ans, *several of the Moderns, as Bartholine, Diemerbroek, Harvey, Glisson, Willis, Lower, Boyl, Ray.*

I Have hitherto spoken nothing of the *Formation of Man's Body in the Womb*, which is far more astonishing than any thing that I have said yet. In respect of this the Psalmist might well say, *I am fearfully and wonderfully made, and curiously wrought in the lowest Parts of the Earth.* There is no account to be given of the stupendous Operation of the *Uterus*, unless we acknowledg a divine Being. This is that puzzling Problem which the wise Man starts, *How the Bones grow in her that is with child?* Eccles. 11. 5. Where the *Bones*, because they hold the whole Body together, are put for the whole Compages of all the Parts and Members of the Body. How this is formed in the Womb, how (*as one of the Ancients expresses it) in a mere similiary Body (such as the Seed is) such a Variety of so great and excellent Vertues should reside as to produce such a Diversity of Parts, and to prepare a convenient Lodging for the Soul, is a strange and unaccountable Work. This *Seminal Power*, this *Architectonick Vertue* was
so

* *Ἐν ὁμοιομερεῖ τῷ σπέρματι τῶν ζώων καὶ ἡλικύτων ἀπο-
καὶ δὲ συνάμεων διαφέρει.* Athenag. de Resur. mort.

so marvellous, that * *Hippocrates* thought the Seed was endued with Understanding and Reason.

Our immortal *Harvey* hath this Notion, that the Functions of this and the Brain are the same, and are therefore called *Conceptions*, and are both immaterial; and from this *Phantasm* or *Idea*, the Lineaments and Proportions of the *Fetus* are drawn, and are so commonly shaped like those of the Parents and Kindred, on whom the Imagination is most fixed. But we must not surmise that this great Man began to *Hobbize* betimes, and dreamt of *thinking Matter*, for any one that peruses his † Book, will perceive that he ascribes not this Power to the Seed it self, but to something divine and celestial that acts thus in it. In several Places of his *Exercitationes*, he acknowledges that by an extraordinary Power of the supreme Being, and not by its own natural Vertue, it effects the Fabrication of the Body. Since him the famous || *Glisson* hath spoken very profoundly of the Nature and Way of *Impregnation* or *Formation of the Fetus*, and he owns it is impossible to solve this Formative and Prolifick Vertue without having Recourse to a divine and supernatural Efficacy. In brief, we cannot describe the plastick Faculty, we cannot give

* Lib. α' αρχών. † De Generat. Animal. || De Ventric. & Intestin.

give an account of the whole Process of *Generation*, which consists of *Conception*, *Formation* or the Delineation of the several Parts, and *Animation* by infusing the Soul; but this we know, that it far surpasses all finite Power. And without doubt Monsieur *Des Cartes*, who was so thinking a Philosopher, would never have ascribed this great Work to mere *Mechanism*, but that he was unawares betrayed into it by his solving of other things by mechanic Principles: So that it would be expected that he should make an uniform Piece of Philosophy. And thence he was, as it were, forced to go through with his Work that he had begun, and to maintain that all is done mechanically, even in the Production of Man.

But that the *Fætus* should live and be nourished in the Womb, is as strange and stupendous, yea, and as unaccountable (unless we acknowledg a divine Hand that disposeth in this Affair) as its being *conceived* and *formed* there. It hath been thought that all the time it resides in those dark Caverns, it receives its Aliment, *i. e.* the Mothers Blood by the *Navel*, as Fruits by the Stalk receive their Nourishment from the Tree; and that it is not nourished by the *Mouth*, because, if it should open it, it would presently be choaked with the Abundance of excrementitious Liquor that the Membranes wherein it is enclosed

closed are replenished with. But others are of opinion, that the *Embryo* is not nourished by the *umbilical* Vessels, but by the *Mouth* only, into which it sucks and receives a lacteal Humour in which it swims: Though unless there be a supernatural Hand in it, this Liquor may as well enter into the Nostrils as the Mouth: The little one thus sucking in Milk in the Womb, learns (they say) to suck the Breasts as soon as born. And as it opened its Mouth to suck, so it may do the same to breath; which some have denied, but it is proved by the *Vagitus uterinus*, attested by Physicians, for a Voice supposes Air and Respiration.

This is the Account which Naturalists lately give of the Nourishment of the *Fætus*, and according to my Judgment (for I find both in *Theology* and *Philosophy* it is a safe way to tack Opinions together, and thereby generally we come to have the whole Truth) it is not irreconcilable with the former Opinion of taking in the Nutriment by the *Navel*; for the young one may be fed partly by the Mouth, and partly by the Navel. The first perhaps is before the perfect Delineation of the *umbilical* Vessels, the second afterwards when there is a perfect Formation of them. A * foreign Physician inclines this way: But, so far as I am able to judge in the case, it is more like-

* *Librand de Diemerbroek.*

likely that for the greatest Part of the time the Embryo is sustained both these ways, that is, the purer Part of the Liquor which is contained in the *Amnios* is attracted by the umbilical Vessels, but the more crass Part which is milky and creamy, is sucked in by the Mouth. So it is nourished both by the Mothers Blood and by Chyle. Thence 'tis no wonder that feeding on a *milky* Substance in the Womb, it looks for it as soon as 'tis born, and that we ever after are nourished by a lacteous Consistency, *viz.* the *Chyle*. Thus the seemingly different Opinions are reconciled, but both of them are amazing and astonishing, and the Matters contained in them cannot be effected without an omnipotent Guide.

No more can the *coming forth* of the *Fetus* be, I mean in an ordinary way, and without *Cæsarean* Infection. Unless we suppose a divine Help and Conduct, this little Prisoner could never with Safety break his Bonds, and get loose from his Durance, and make his way into this Light. That it lived in its close Confinement was wonderful, and that at last it comes alive into the World is so too. That this Weakling was not stifled when it was there, and when it left that Place, is equally wondrous. All we can say is, that this is owing to the marvellous Care of the Almighty, to the particular Midwifery of
Hea-

Heaven. Accordingly, * *Galen* admires the Providence of God in the wonderful Exclusion of the *Fætus*. And so doth one of the most acute Philosophers and Physicians among the *Arabians*, who acknowledges † that the Separation or Divulsion of the Parts in order to the making way for the *Fætus*, and the restoring of them afterwards to their right Position, and that without any Hurt, is to be reckoned as the *Work of the most high God*. Wherefore we find this signally taken notice of by the devout Observer of the Works of Nature and Providence, *Thou art he that took me out of the Womb*, *Psal.* 22. 9.

Besides what has been said, the Providence of God is observable in this, that *Man's Body*, as to its Parts, Shape and constitution is more serviceable for laborious Work and Business than that of the *Woman*, because she was not designed to have her share so much in these as Man. The Breasts or Paps of Women being tender and very prominent, render them unfit for several Employments; therefore the *Amazons* cut one off. If it were proper to recount several things relating to the particular Temper and Indispositions of that Sex, it would thence appear, that the Bodies of Males are much stronger in their Make, and thereby the divine Providence and Wisdom

H

are

* *De usu part. lib.* 15. † *Avicenna.* 1. 3. tract. 1. cap. 2.

are discovered, in that the Composition and Frame of the Sexes are according to the Ends and Uses they were particularly and distinctly intended for by the omnipotent Creator.

Lastly, those Parts of the Body which Modesty bids us conceal, lest chaste Minds and Ears should be offended, are as great a Proof of a wise and intelligent Being as any of those that I have named and insisted upon. Those secret Parts are manifest Indications of the divine Prudence and Goodness. Here we may apply that of the Apostle, *Those Members of the Body which we think to be less honourable, upon these we bestow more abundant Honour: And our uncomely Parts have more abundant Comeliness. For our comely Parts have no need: But God hath tempered the Body together, having given more abundant Honour to that Part which lacked, 1 Cor. 12. 23, 24.* God himself hath transcendently honoured them by constituting them the Organs of Humane Generation, whereby is produced this excellent and amazing Fabrick of the Body which I have been treating of, whereby Mankind is propagated, and the *Species* continued, whereby this World is peopled, and whereby Inhabitants are provided for a better World. And all this argues great Providence, Wisdom and Bounty, and is worthy of the divine Author of all Beings.

To approach towards a Conclusion, let us briefly reflect upon the whole, and stand amazed at the innumerable Wonders which the Body of Man presents us with, and which are all of them Demonstrations of a Deity and a divine Providence. When we see an excellent Piece of Architecture, as a beautiful Temple, a stately Palace, or some other notable Structure, we with great Delight dwell upon the several Parts of it, and at last pronounce it to be the Product of an excellent Art and Skill, of great Project, Counsel and Contrivance: And no Man of Understanding doubts that it is so. Have we not as great, yea greater reason to acknowledg that the *Body of Man*, that fair and stately Fabrick, the several Rooms and Apartments of which I have been describing, is the Effect of Wisdom and Skill, yea of that which is divine and supernatural, seeing we know full well that no Humane Art or Finite Power is able to erect such a Building, nor the least Part of it? There is more Understanding and exquisite Invention, an exacter Disposition, a more curious and accurate Proportion of Parts to be discerned in this magnificent Structure than in the skilfullest Piece of Architecture in the World. Let us then admire and adore the Skill of the great and eternal Geometrician, and let us reverence and

applaud this divine Workmanship, the Master-piece of the whole Creation.

The Body of Man is called a *Temple*, *Joh. 2. 19. 1 Cor. 6. 19.* and the admirable Contrivance of it shews who was the Maker and Builder of it. The uppermost Part of this Humane Edifice, that higher Region where the Soul is seated, is the *Holy of Holies* in this Temple, and God himself may be said to dwell here. In this noble Part is the sacred *Ark* which contains the *Law of God*: Here is the *Oracle* which God hath set up in us to instruct and inform us. The middle Parts of the Body are the *Sanctuary* or *holy Place* of this Temple, where upon the *Altar of the Heart*, a continual *Intense* is evaporated, and the two *Ventricles* belonging to this choice Part, are the *Lamps of Oyl*, the *Biolychnium* which is ever burning and ever spending. The lower Division of the Body, with all the extreme Parts that appertain to the whole, are the *outward Court* of this sacred Building, wherein the most remarkable thing is the *Stomach*, the *Altar of Holocausts* which are offered every Day incessantly, and where *so many Beasts are consumed*. I need not speak of the *Reins* and other Vessels which in this Temple supply the Place of the *Laver*: Nor need I go further and enumerate the several *Offices, Chambers, Repositories, Treasuries* belonging to the whole Structure, all which pro-

proclaim the Wisdom of the omnipotent Architect.

The infinite Loveliness and Perfection of the divine Artificer are shadowed forth by his lovely and compleat Pourtraiture of them. Who can sufficiently admire this when he beholds the Variety of the Structure, the Diversity of the Workmanship? When he observes the Parts and Vessels in Man of so different kinds, when he takes notice of the several Offices and Functions belonging to Concoction and Nutrition, and the Elaboration of the Blood? When he views the strange Conveyances, the greater and lesser Channels and Conduits for the Liquors and Juices contained in it? When he considers how this Structure is supported with *Bones*, guarded and fortified with *Limbs*, cloathed and fashioned with *Flesh*, strengthened with *Cartilages* (which are of a middle Nature between *Bones* and *Flesh*) warmed and beautified with *Fat*, covered on the outside of all with a *Skin* and *Under-Skin*, covered within with several *Membranes* and *Tunics*, enlivened and actuated with *Spirits*, supplied with these by the *Nerves*, moved and set on work as by these, so by the *Muscles* and *Tendons*, furnished with *Blood* by *Veins* and *Arteries* (whether greater or capillary,) joyned together with *Ligaments* (another sort of Substance of a middle Nature between a *Membrane* and a

Cartilage (wherewith the Joynts of Bones and the Gristles are bound together?)

Thus (as the Apostle speaks like a natural Philosopher, expressing the admirable Dependence of one Part of the Body on another, for his Words are a plain Allusion to this) the *whole Body being fitly joynd together* (συναρμοσθέντων) and compacted (συνβιβασθέντων) by that which every Joint supplieth according to the effectual working in the Measure of every Part, maketh Increase of the Body, Eph. 4. 16. And again, with Reference to the natural Head and Body he saith, and that most significantly, ----- the Head, from which all the Body by Joynts and Bands having Nourishment ministered, and knit together, increaseth, Col. 2. 19. which is a brief and summary Account, not only of the sovereign Influence of the Head (the Fountain of Spirits) on the whole Body, but of the harmonious Connection of the several Parts, of the close Conjunction and Agreement among themselves. By those αἶμα καὶ σύνδεσμοι (as this holy Writer truly and properly stiles them) those several *Junctures and Bands*, the Body is compacted, made fast and firm, and cannot be disordered easily by a violent Motion: And yet at the same time it is by means of these rendred pliant and flexible. Such is the various Work of the divine and wise Contriver, such are the mighty Wonders that are interspersed through all the Operations of the Body. This

This therefore is the thing I urge, that in the Make of all these Parts of the Body, there is observable, a *Design*, an acting for some *End*: And this infallibly leads us to a *God*. It was madly and sottishly said by *Lucretius*,

* *Lumina nè facias Oculorum clara creata,*

Prospicere ut possimus,

and much more to that purpose, the sum of which is this, that the Eyes were not made to see, nor the Ears to hear, nor the Tongue to speak, nor the Legs and Feet to walk, but Men having Eyes, Ears, &c. make use of them for seeing, hearing, &c. It were to be wish'd that this Poet had not been englished by so fine a Hand as he is, for by the extraordinary Goodness of the Verse, the Badness of this Epicurean's Notions is (I fear) unhappily instilled into the Minds of young Gentlemen. Though it is true also, that the Extravagancy and Absurdity of them are their own Antidote, where there is a considerate Reader. So that it may be said, the ingenious Gentleman, who hath done this Author into our Language, hath exposed him as well as translated him. Certainly no Man can have the Face to deny that the Bodily Parts have a *Correspondence* with one another, and are mutually helpful in their Offices, which could never have been unless they had

H 4

been

* *Lib. 4.*

been with Wisdom fitted and accommodated for it. No Man of tolerable Understanding can deny that the *Eyes, Ears, Lungs, Heart, Stomach, &c.* were made for those individual Purposes of seeing, hearing, breathing, sanguification, Concoction, &c. He that considers that the *Veins* have certain *Valvulae* of a peculiar Texture, proper for promoting the Course of the Blood, and that the *Arteries* have their convenient *Filaments* for dispersing the spirituous Parts of it, cannot but own that they were appointed for these very Purposes. All this shews wise Forecast and Design, and consequently proves a supreme Intelligence that actuates the World.

Say that I have not exactly and punctually explained the Design and Intent of Providence in all the Parts and Vessels of the Body which I have mentioned; say that there be various and different Opinions concerning the Use of some of them, (as will easily be granted) yet we cannot possibly err as to this, that the most of them were designed for those very particular purposes which we have named: And as to the rest, there is some great and noble Use for which they were made, and this is promoted and effected whether we know it or no. Suppose some of those *Hypotheses* I have proceeded on should be false (as *Anatomy* and *Physick* are improved daily, and new Discoveries are made) yet
this

this will no ways invalidate the Design of my Discourse, because, though some of these things in the Body of Man be solv'd by other Principles and Maxims, the things themselves will still be serviceable to shew the Wisdom and Providence of God. Nay, perhaps they will be more strange and wonderful according to *other Hypotheses* or Principles than in that way which I have offered for the Solution of them. Whether *Bartholine's* or *Sylvius's* or *Willis's Hypothesis* be truest, it is not requisite to be fully satisfied. It is not necessary for us to know whether *Pecquet*, or *Des Cartes*, or *Malpighius*, or our own *Harvey*, *Glisson*, *Wharton* or *Needham* have given the best Account of some Functions of the Body, for however they may differ, they agree in acknowledging the admirable Contrivance of them. And from the *things themselves* which we have propounded it is apparent that the Body hath *animal, vital* and *natural* Powers in it, and that it is extremely fitted for the Discharge of the several Offices belonging to these, and that there are different Vessels and Parts made use of in order to it. And we see that all things are plainly contrived for the best, and for promoting the Welfare of the Body. This is that which I have been evincing, and this is enough to prove the great Hand of God in the Make and Constitution of the whole.

And

And as for the *exact Symmetry* of all the Parts taken and considered *together*, it hath been the Subject of many wise Heads, and will yet further conduce to my present Design, which is to assert a Deity from the Configuration of Man's Body. They agree in this, that the Proportions and Dimensions of it are extraordinarily accurate and harmonious, and that the Parts exactly answer to one another, both as to the Longitude and Latitude. It is so excellently proportioned, that, if we may credit * *Vitruvius*, who was a good Judg in this Case, the Measures of *Temples*,
 ° *Ships* and *Engines* were taken from it. And in another Place he saith, that every well-built *House* must be according to the Proportion of the Members of a well-figured Man. It was long since observed by † two eminent Writers of the Church, that there were the same Proportions in the Fabrick of the *Ark*, that there are in the Body of Man. So a || curious Person of this latter Age takes notice, that this ancient Structure was accommodated to the Dimensions of Humane Bodies; that is, its Longitude was sixfold to its Latitude, and tenfold to its Profundity : And hereupon he takes occasion to declare, that there is such a Harmony and Symmetry of
 the

* *Lib. 3. c. 1.* † *Augustin. de Civ. Dei. Ambros. de Arcâ Noë.* || *Kircher de Arcâ Noë.*

the Members, that they all have an exact Reference to one another: Whence he infers (and that rightly) that there is something divine in the Disposition of the Parts of Man's Body.

Other learned Pens, as *Cardan*, *Mizaldus*, *Gauricus*, treat of this choice Theme, the orderly and harmonious Conformation of the Parts. So do * *Johannes Baptista Ricciolus* and † *Albertus Durerus*, the latter of whom endeavours to prove that the whole Art of *limning* and *pourtraying* is borrowed from the *symmetrical Proportions* of the Body. *Lucas de Burgo* and *Augustinus Gallus* on *Vitruvius* insist upon these exact Figures and Delineations of the whole Humane Structure: They inculcate this, that there is a just and perfect Conformity in our Bodies, and particularly that the Heighth of Man is the same with his Breadth, *i. e.* the Space between Head and Feet, and between the Hand stretched out is alike, as was long since observed by a || learned Naturalist. So Man is of a quadrate Figure: And yet, if you place him thus with his Arms and Hands stretched out, you'll find that the Figure of his Body makes a perfect Circle, the Center whereof is his Navel.

Here,

* De Geographiâ. † De Symmetriâ, &c. || Quantum spatium hominis à vestigio ad verticem, tantum esse passis manibus inter longissimos digitos observatum est. Plin. l. 7. c. 7.

Here, if I may so say, we have found the *Quadrature of a Circle*, we may discern the Symmetrical Mechanism of the Body.

As we observed before (when we had occasion to speak of the *Lungs* and Heart, and other Parts of the Body) that the *Motions* and *Operations* of it are exact and geometrical, so now it is evident that the *Figure*, *Shape* and *Proportion* of it, with the Situation of all the various Parts and Organs are so too: And hereby they become the more subservient to one another, and mutually assist in the Functions of Life, Sense and Motion. This is no Workmanship of Humane Skill, here is no *Automaton* made by Art, no *Dadalus's walking Venus*, no *Archytas's Dove*, no *Regiomontanus's Eagle and Fly*. Here is none of *Albertus magnus* or *Frier Bacon's speaking Head*, or *Paracelsus's Artificial Homuncle*. Here is nothing but what proceeds from a divine Principle and Art, and therefore cannot be reckoned among those mechanical Inventions which have an external Shew of Sensation and Life for a time, but are destitute of a vital Spring. If all other Arguments should be laid aside, yet this single one, from the Fabrick and Syntax of Man's Body is sufficient to evince the Truth of a Deity. This particular Frame and Constitution will extort a Confession of the Existence of an infinitely powerful, wise and Beneficent Being.

And

And this is a Topick which hath been constantly made use of by confiderate Men in all Ages of the World. Not only by the Psalmist in that excellent Hymn which I have so often quoted, but by him again in *Psal.* 119. 13. *Thy Hands have made me and fashioned me.* Which Words it is probable, he borrowed from holy *Job*, whose Writings were much ancients than his, where he more than once argues from the Structure of his own Body; *Thy Hands* (saith he) *have made me and fashioned me together round about,* *Job* 10. 8. *Thy Hands*, i. e. thy divine Power hath elaborately and curiously formed me (for the Words are very expressive in the Hebrew) with Flesh, Muscles, Nerves, &c. for these (as the Rabins observe) are called *gnatsabbim*, from the Verb *gnatsab* here used. And the other Words are as observable, *together round about*, which expresses the Formation of every Part with the same Elaborateness and Exactness. The whole Circumference of the Body shews the divine Art and Care. He proceeds, v. 10. *Hast thou not poured me out as Milk, and curdled me like Cheese?* Which is a modest and chaste *Simile* to set forth the Conception in the Womb, and to signify how the tenuious and thicker Parts of the seminal Mass are separated, and turned by degrees into a fleshy Substance. Thou didst (saith he) in the first Formation of me, temper my
Body

Body with a most transcendent Wisdom; thou didst make some Parts of it liquid resembling a milky Substance ; but others thou wast pleased to make more firm and consistent, and as it were, to *coagulate* them, that by this Solidity and Compactness they might be able to contain and keep in the other more loose and fluid Parts. He adds, *v. 11. Thou hast clothed me with Skin and Flesh* (as with an upper and an under Garment) *and hast fenced me with Bones and Sinews* : By this Diversity of Parts thou hast rendred my Body fit for those excellent Ends to which thou at first ordaindest it. This mightily convinced him of the Power, as well as of the Being of God, and therefore he again (*Chap. 31. 15.*) acknowledges this very thing, *viz. that God made him and fashioned him in the Womb.* The Prophet *Isaiah* often endeavours to confirm his Countrymen in the steady Belief of the Almighty Jehovah from this very Consideration ; *The Lord made thee and formed thee from the Womb, Isaiah 44. 2, 24. 49. 5. &c.*

And in the sacred Writings of the new Testament this Argument is not omitted, as is clear from what I alledged before out of the great Apostle *St. Paul*, from whose Words we learn, that the merciful and indulgent Creator hath, in the Configuration of Human Bodies, consulted the Necessities, yea,
the

the Health and Delight of Mankind. There is another excellent Passage in this inspired Author concerning the same Subject, which I will here set down at length, that the Reader may observe the Philosophical Genius of this accomplished Man, who was as great a Naturalist as he was a Divine, and was perhaps as able to read a Lecture of Natural Philosophy as of Theology and Christianity. *The Body, saith he, is not one Member, but many. If the Foot shall say, because I am not the Hand, I am not of the Body; is it therefore not of the Body? And if the Ear shall say, because I am not the Eye, I am not of the Body; is it therefore not of the Body? If the whole Body were an Eye, where were the hearing? If the whole were hearing, where were the smelling? But now God hath set the Members, every one of them in the Body, as it hath pleased him (i. e.) they are disposed and ranked according to his infinite Wisdom, &c.* These are the weighty Words of this incomparable Naturalist, and the Summ of them is, that the Frame of all the Parts and Members of the Body is suited exactly to the Service, Advantage, and Welfare of the whole, and that this admirable disposing, fashioning and tempering of the Body is an absolute Proof of the divine Skill and Providence: Though I grant that he applies these things to a far higher Subject.

The *Christian Fathers* and ancient Writers of the Church were wont to insist upon this Theme. *Minutius Felix*, after he had been speaking of the peculiar Providence of God in the erecting of Human Bodies; concludes at last, that * *there is no one Member appertaining to them but is both for Necessity and Comeliness.* *Lactantius* hath a *Book of the Workmanship of God*, wherein he descants on the Body and all the Parts of it, arguing a Divinity and Providence from them. † *Theodoret* undertakes to prove the Providence of God from the Fabrick of Man's Body: And || particularly from the Consideration of the Composition of Man's Hands. *Basil* and *Gregory Nazianzen* have writ of the Creation and Formation of Man: And the latter of these very elegantly calls the Structure of the Body, τὸ τεχνηδὺν καὶ φθαρτὸν, *the natural Artificialness* of it. *Jews*, as well as *Christians*, have owned this Argument, else we should not have it among the Sayings of the Rabbins, that the *Body of Man is a Symbol of the divine Precepts.* Which though they vainly make out, telling us, that the affirmative Precepts are 248, and so many are the Members of the Body: The Negative are 365, and so many are the Nerves, yet 'tis evident

* *Nihil in homine membrorum est quod non & necessitatis causa sit, & decoris.* † *Orat. 3. de Providentiâ.* || *Orat. 4. de Provid.*

evident that they look upon the wonderful Fabrick of the Body as a Testimony of a Deity. Philo the learned Jew declares, that * *the Care of Providence is manifest in every Part of this Contexture*; and particularly he instances in the erect Figure of Man, and thence pronounces that *he alone of all the Animals † is set in a select and eximious Posture*.

The Gentiles are not dissenting from the Jews in this particular. Galen, whom I had occasion to mention before, || concluded there was a divine Creator when he had considered the Body of Man, and discovered the particular Frame of it. He acknowledgeth that the Order, Use and Disposition of it is such, that there is nothing defective, nothing redundant in it. Whereupon he religiously and devoutly sets forth the Praises of the Almighty, and adores his Wisdom and Goodness. He proclaims to the World, that this divine Being was pleased to adorn and beautifie things better than ever Art could do it. And these Acknowledgments he saith he makes, although he had done all he could that the excellent Structure and Composition of Animals, and the reason of them might be ascribed to the bare Mixture of the Elements,

I rather

* Παντὶ γὰρ μοεῖω τὸ σῶμα † ἐμπαίνειται ἡ προνοία ἢ προμήθεια. De Plantat. Noe. † ὁ Θεός τε ὁ καὶ ἀσχευὴς ἔλα-
 χεν ἄνθρωπον. Ibid. || De usu partium, lib. 3, 11, & 17.

rather than to God the Maker of all. Many of the *Greek* Philosophers have pitched upon this Topick, stiling Man * *the greatest of all Wonders*, † *the Measure and Standard of all Creatures*, and the Perfection and Complement of them. One of the most learned and sensible of the *Latin* Philosophers, I mean || *Tully*, hath largely proved from the several Parts of Man's Body, that it is a divine Fabrick.

This is excellently performed also by some of our *Moderns*, even of the last and of this present Age: *Bartholine* and *Isbrand de Diemerbroek* and other foreign Physicians and Anatomists (be it spoken to their Praise and Honour) have from their Discoveries in this lesser World asserted the Notion of an infinitely wise Creator. At home we have several eminent Persons of the same Faculty, and other learned Philosophers that have vouched the Existence of a Deity from the wonderful Organization of the Body of Man, from the exquisite Frame of the several Parts fitted exactly to their several Ends. The most celebrated *Dr. Harvey* in his *Book of Generation* and other Treatises most devoutly owns a divine Power, a heavenly Wisdom in the Formation of the Parts of Man, and frankly confesses that it cannot be otherwise solved.

The

* *καὶ μὲν θεοῦ καὶ ἀνθρώπου. Plato.* † *μέγεθός ἀπάντων. Pythag.*
 || *De Nat. Deor. l. 2.*

from the Fabrick of Man's Body. 131

The learned and solid Dr. *Glisson* in his Searches into some peculiar Parts doth piously acknowledg the same, and from this very Argument establishes the Notion of an immaterial and intellectual Being. Who is more forward in admiring the divine Omnipotency and Contrivance in the several Vessels and Organs that Man is constituted of, than the renowned Dr. *Willis*? In all his Writings he theologizes, and constantly resolves the Operations and Functions which we wonder at in Men's Bodies, into the Care and wise Disposal of an infinite and perfect Intellect. Dr. *Lower* speaks like a *Divine* when he treats of the *Heart*, and preaches a God from the Anatomy of it. The noble and famous Mr. *Boyl*, through all his Philosophical Writings, endeavours to discover a God in the Works of Nature, and successfully baffles Atheism by the sole Help of natural Philosophy; and particularly in some Places by Considerations drawn from what is observable in Humane Bodies. And the worthy Mr. *Ray* in his late *Treatise of the Works of the Creation*, forgets not to argue against Atheists from the same Head.

This may encourage those that have Opportunity and Ability to acquaint themselves with the Structure of Man's Body, and to spend some time in the View and Contemplation of this admirable Composure. This will

be an Employment, not only diverting, but useful to them: By considering the Configuration of their Bodies they will happily advance the Devotion of their Minds: By searching into themselves they will find a God. For this is that which I have been all this time evincing (and I hope I have, in some measure, accomplished it) that Man, the perfectest Model of created Excellency, is the Representation of God; that even in his outward Form there are indelibly engraven the Marks of divine Power, Wisdom and Bounty; that here are to be seen and admired the signal Characters of the Heavenly Image, the very Lineaments of a Deity.

C H A P. VII.

An Apology for Physicians: Wherein there is given an account why they commonly lie under the Imputation of Irreligion and Atheism, viz. 1. From a Vulgar Prejudice which hath prevailed in the World, and that among Gentiles, Jews, Christians. It had its first Rise from that Averseness which was justly shewed to those who were only Pretenders to the Art, and abused this Noble Profession. 2. This Prejudice is partly nourished by the particular Deportment of the Persons of this Faculty when they visit their Patients. 3. It may perhaps, be increased by observing how seldom (in respect of some others) they appear in Places of Publick Devotion. 4. It may be occasioned by their Promiscuous Converse. 5. They may, by some, be thought to have no Religion, because they have so much Philosophy. As for such of this Faculty as really favour Atheism in their Speeches and Practices, this is not to be imputed to their Particular Art and Calling, for there are some very Bad Men of all Professions. There are some Footsteps of Religion in the Prescriptions of Physicians. Galen was in his way devout. Modern Physicians have been Illustrious Examples of Christian Piety and Devotion, and Great Assertors and Patrons

*of our Holy Religion. A Physician, as such,
is disposed to be a Wise and a Good Man.*

I Had, in the foregoing Chapter, put a Period to this Discourse, but that a *Query*, or you may call it an *Objection*, came in my way, which I am willing to return some *Answer* to, lest what I have said receive some Prejudice and Harm from it. It may be demanded why natural Philosophers and Students in Physick, whose Employment it is to search into the Works of Nature, to dive into all those things which appertain to the greater or lesser World, and who are well acquainted with those natural Operations which are said to be found in both, are generally observed to have but a small Portion of Religion?

But more especially, the *Objection* lies (as some imagine; how truly you shall hear afterwards) against those Philosophical Men who chiefly study the Nature of Man's Body, and scan all its Parts, and have a very distinct Knowledge of the excellent Structure and Composure of it. What is the reason (say they) that such great Numbers of these Persons have so little Sense of a God in their Lives? Why do some of them profess an Indifferency as to Religion, and scarcely acknowledge the Author of it? Yea, why do some endeavour to expel both of them out of the
the

the World, and to introduce Atheism, Scepticism and Prophaneness? Whence is it that these Men see little or nothing of a Divine Being or Providence in the Works of Nature, who yet one would think should discern these sooner than any others, because they are constantly conversing with such Objects as are said to be visible and apparent Proofs of a God, and of his stupendous Wisdom? May we not rather be inclined to believe that the Matters before discoursed of are no Arguments of the Divinity, and that we wrongly infer from the Parts of the World, or of Man's Body, that there is an infinitely wise Author and Contriver of them? For if there were, what Reason can be given why these learned and diligent Enquirers into these Matters are so far from evidencing it by their religious Lives; that on the contrary they confute it by their blasting of all Religion, and laughing at the very Notion of a Deity?

I answer, though this among some may be the Character of *Natural Philosophers*, and particularly of *Physicians*, yet it doth not follow thence that we are to believe it to be true. Yea, it is certain that it is founded upon Mistake, and is occasioned by a false Representation of some Matters which relate to the Persons of that Faculty. And to be particular, I conceive there are these following Reasons why *They*, rather than others, lie under

the Imputation of Atheism and Irreligion. First, this proceeds from a common and vulgar Opinion which hath prevailed in the World. They have been anciently struck at, and some severe Commonwealth's Men would not suffer them to be Members of Humane Societies. *Plato* was for banishing them out of his *Republick*, and *Cato the Censor* was a deadly Enemy to them. The old Gentleman did not love to hear of Sickness or Death, or suppose any such thing. He could dispatch himself without Physick if there were occasion. He had a present Remedy against all Diseases. He could, like his Grand-son, cure himself with his Sword. *Æsculapius's Temple* was without the City of *Rome*, that it might appear thence, saith * *Pliny* the Elder, that the *Romans* did not willingly, but of necessity, attribute any thing to Physicians. Indeed this Author (as is evident from that Chapter where he thus speaks) was most bitter (on what account is hard to tell) not only against *Physicians*, but all *Medicks*: But this is no Reproach to them, for this Writer, who gives too great occasion to his Readers to think him to be an *Atheist*, would not have been so severe against *Physicians* if he had taken them to be such. It is certain that the unprejudiced and wise had other

Sen-

* *Nat. Hist. l. 29. c. 1.*

Sentiments of them, and looked upon them as useful Members of the Community. Nay, *Plato* himself (as we may be informed from his * Writings) seems to be against Physicians in this respect only, that dissolute Men were encouraged to live in Debauchery and Luxury, and to expose themselves to Diseases, in assurance that they could be cured by these. For the like reason the old *Censor* before named was a great Enemy of Physicians, and † would not have them brought from *Greece* to *Rome*. These Statesmen and Philosophers thought Physick was a Promoter of Vice; but a Man would think these politick Heads might have better secured their Commonwealths against it by inflicting severe Punishments on the vicious, than by expelling the Ministers of Health.

But truly, if we narrowly examine the matter, we shall find that both these great Men (notwithstanding what *Pliny* suggests) had no Antipathy against the Professors of Medicks barely considered, but only so far as they abused their Profession. They were not against Physicians, but Pretenders to the Art (and who indeed is not against them?) Who always did more Harm than Good. *Julius Caesar* knew the Worth of the former, that is, such as were Men of Art and Skill,
and

* *De Repub.* l. 3. † *Plin.* l. 29. c. 1.

and accordingly * he made them free of the City of *Rome*. But vulgar Souls, who search not into the true Nature of things, from the Dislike which some considerable Men had of the ill Managers of this Art, took up a Disesteem of all the Professors of it, and ranked them among the worst of Men. And even the learned, to comply with the common Notion, have sometimes inveighed against the Sons of *Æsculapius*, and a great many piquant Sayings are found against them. The *Jewish* Masters are extremely forward to gratifie the People in this Point, and are full of their Sarcasms to this purpose; but *Rabbi Juda* outstrips them all, who is positive that † *the best of Physicians go to Hell*. Thither this circumcised Doctor sends them to cure them of their Disease of *Atheism*, which he thinks they are all incident to, for there are no *Atheists* in that Place. Among *Christians*, as well as *Pagans* and *Jews*, this Opinion hath taken place, and the *Religion of a Physician* is looked upon as a *Chymara*, and is turn'd into Sport and Ridicule. Many verily think that their *Art* makes them *Atheists*, that when they commence in the Faculty, they take an Oath to abandon all that is pious, and that for the future they know and think of no other *Day of Judgment* than that of their *Crisis* on a Disease.

They

* *Sueton. in vit. Jul. Cæs.* † *Kidushin seu de sponsalib. c. 4*

They are perswaded that what was said of some Physicians of old is true of all in every Age of the World, viz. * that *they know nothing but what is perceived by Sense, and attend only to the Body*, as if they were mere sensitive Animals. Whilst they go a *Simpling* they are thought to be condemned to *Nebuchanezzar's Fate, Fields and Grass*, and so become brutish and sensual. They take the poetick Fable to be Truth, viz. that *Chiron*, a noted *Physician*, was half a Man and half a Horse, and they will allow the rest of that Order to be no other than *Centaurs and Monsters*.

All this proceeds from an old Prejudice against them, which first began among the vulgar and such as have shallow Apprehensions of things. It may be, they took offence at their Language, which generally is not like that of other Men. Perhaps they disrelisht their hard Names both of Diseases and Medicines, and thought those could be no very good Men who use a sort of *Conjuring*, as they take this to be. Or, it is likely their Prejudice may arise from Covetousness as well as Ignorance, they would have a cheap Health, and therefore they listen with great Attention and Concern to what is reported of the old Romans, that after they had banished

Phy-

* Μὴ δὲ νομίζετε ὅτι τὸ αἰσθάνεσθαι, καὶ οἷς μόνα τὰ σώματα μαγικὰ ὄντες. Pfellus.

Physicians, they six hundred Years together preserved themselves sound and in perfect Health by eating only of *Coleworts* or *Cabbage*. Some have an Averseness to *Doctors* (as they call them) because it is chargeable. Nay, there are some fantastick Folks that think these Persons can cure a Disease no other way than by killing the Patient. The very *Colledg-Dispensatory* seems to them to be but the Office for *Burial*: And the *Apothecary's Mortar* rings the Man's first Peal. It is no wonder that such *Cabbage-eaters* as these vote our Artist to be a very bad Man.

Again, this Conceit may be nourished by the particular Behaviour which is observed in them when they visit the sick. They seem to be regardless of their Danger, and though they know that their Case is deplorable, and even desperate, yet they remind them not of another State, and of preparing themselves for it. Whence some are apt to gather, that they believe no such thing themselves. But this is a very uncharitable Inference, and those that make it, consider not that the *Physician* and the *Divine* come to the Sick on different accounts, and to discharge different Offices. The latter is to take care of their immortal Part, and to address himself to them accordingly: But the business of the former is to advise and administer what is proper for the restoring of their Bodies to Health;

Health; and if they faithfully employ their Care about this, they discharge their Part.

Not but that it is to be wished that they would (and I doubt not but some of them do, especially when there is no Clergyman at hand) as Good Men and Fellow-Christians apply themselves to their Patients as they see occasion, and make use of this seasonable Opportunity to discourse religiously to them, to admonish them concerning their former Actions, to urge them to repent of the Evil of them, to beg the divine Pardon and Favour, and to fit themselves for a better World, when they see they cannot keep them any longer in this. But yet Discretion must go along with Religion, and therefore, though they perceive that the poor Clinick is incurable, yet they are not obliged to tell him so with their own Mouths ; but it is better to commend this Office to some of his Friends and near Relations. This is more seasonable and prudent than a personal Application to him, for it doth not become the Physician to doom his Patient. And let us be cautious of censuring and dooming the Physician.

Moreover, this may be one cause why they are voted to be *Irreligious*, because they are not seen so often at the solemn Places of Devotion, they are not so frequent at the publick Prayers and at Sermons as other Men.

A *Physician* oftentimes hath the Character that *Horace* gives of an *Epicurean*,

* *Parvus Deorum cultor & infrequens.*

But if the *Law*, which is grounded on good Reason, excuses them in this case, I see no reason why we should not. Their necessary Avocations are a sufficient Plea for them: Yea, an Act of *Mercy* is preterrable to *Sacrifice*. To save a Man's Life is an high Act of Charity, which is one of the most substantial Ingredients of our Religion. † *To heal and to worship* are expressed by the same Word in the Greek: And || a *Healer* and a *Priest* are synonymous in the same Language. I am sure we may here make good use of the *Criticism*. A *Physician*, whilst he is conscientiously discharging his Office, is accepted as if he were employed in divine Worship, yea, as if he were an immediate Minister of Religion. Therefore the Cavil hath no Ground, no more than that of the *Pharisees* against our Saviour, that he healed on the Sabbath day.

Furthermore, this Rank of Men may perhaps incur the Censure of *Irreligious*, because their *Converse* is so promiscuous, and they oftentimes are concerned in the worst Company,

* *Od.* 34. l. 1. † *θεραπεύειν*, mederi, adorari. || *θεεργαίης* & *ιερεὺς*, idem. J. Pollux in *Onomast.*

pany, I mean the worst that can be for Religion, that is, some who are professed Patrons of Atheism, and whose Practice is suitable to such a Principle. It is true, if they frequently associate with such, and in hope of a Fee, comply with them in their Folly and Madness, yea, if they do but so much as connive at these, they pay dear for their expected *Guineas*. But if only in the way of their Profession, they converse with such Persons, that they may be serviceable to them, by preventing the Maladies they fear, or curing those they labour under, I do not see Cause to condemn them. The *Objection* will lie as reasonably against *Divines* who have the Charge of Souls, who if they will *fulfil their Ministry* (as the Apostle advises) and perform all the Parts of their sacred Function, must visit their Flock, and hold Converse, even with the worst, to reclaim and reform them: Which is no more than what our Lord did when he *eat and drank with Publicans and Sinners*.

Once more, some devout and well-meaning Persons may think *Physicians* have no Religion because they have so much *Philosophy*. They hear them talk so much of Bodies, that they are ready to infer, they have no Sense of the other Part of Man. Whilest they solve things in a natural Way, they are suspected to own no supernatural Principle. But this is an erroneous surmise, for these things

things do not exclude one another. A Man may be a Philosopher and a Christian: He may (nay he must) acknowledg a first Cause, though he holds that there are secondary ones: Divine and natural Agents are not inconsistent. The Discourse of a Physician should savour of both these, especially the former, and then the observing World would have no Cause to object against them the want of Religion: Then it would be seen that their excellent Employment hath Influence on their Practice, and furnishes them with devout Thoughts of God, and a firm Belief of his infinite Power and Wisdom. Thus you have my Thoughts concerning the Occasion of that Calumny which *Physicians* generally lie under. I have endeavoured to take off those Prejudices and Censures which seem to reflect a Scandal on that noble Profession.

But if it be further urged, that many of them are really such as they are reported to be, yet this doth not at all invalidate the Proposition which I have asserted: For either we speak of *Physicians* improperly so called, that is, ignorant Quacks, &c. Or those that are learned and well skilled in the Faculty. As to the former, they deserve not the Name of *Physicians*; and therefore, though it could be proved that some of these are *Atheists*, yet it cannot be imputed to the Faculty, because they are not properly of it. Yea, I further
grant

grant that Ignorance in Medicks, as well as in all other learned Arts, capacitates Men for Atheism. As for the latter, *i. e.* those who are skillful in this Science, and merit the worthy Title they bear, it is not to be denied that even some of these have procured to themselves the Imputation of Atheism and Impiety by their prophane Speeches and irreverent Discourse about sacred Matters, and by their scandalous and enormous Actions.

But what is this to the Purpose, unless it can be proved that their being *Physicians* makes them talk atheistically, and that the Study of Medicks is the Cause of their Prophaneness? There are some Professors of the *Law*, and some in *sacred Orders* whose Lives are a Reproach to their Studies and Calling: But did ever any Man of correct Thoughts lay the Fault of this on the Profession of Law or Divinity? So it is in the present Case, the Faculty is not blameable: The Persons we are speaking of are not made Atheists by being Students in Physick, but being atheistically inclined before, they bring a Scandal on the Profession. Their Irreligion is not the Effect of their searching into natural Causes: They do not scruple a Deity or divine Providence, because they have an Insight into Humane Bodies, and all the Operations of them, but this may be truly said,

K that

that their being debauched and wicked Livers makes way for their atheistical Notions and Sentiments.

But this is to be said further, that it is unreasonable and unjust to libel the whole Faculty for the sake of a few ; for all unprejudiced Men must own that there have been, and are as few of that Profession (considering the Proportion of them) as perhaps of any other that are regardless of sacred things. If a Man looks into their *Dispensatories*, he shall find that they have made use of *God's Name*, and some of the *Saints*, and of the most *holy* and *venerable things* even in their Art. There are some Footsteps of *Religion* in several of the Names which they have given to medical *Simples* and some *Compounds*. *Wood-Sorrel* hath been stiled by them *Allelujah* : *Heartsease*, an *Herb of the Trinity* ; (though indeed * *Dr. Brown* saith, this is named from the Figure of its Leaves :) *Angelica* an *Herb of the Holy Ghost*. *Mugwort* hath been called *Saint John's Girdle* : Other Herbs have the Name of *Saint John's-wort*, and *Saint Peter's-wort*, and *Saint James's-wort*. *Cardamom-Seeds* are called *Grains of Paradise* : *Solomon's Seal* is *Scala Cæli* with them. Another Plant hath been christened *Herb of Grace*, and another *Holy* or *Blessed Thistle*.

* *Vulg. Err. l. 1. ch. 7.*

Thistle. And it is likely, *our Lady's Thistle* refers to the *Virgin Mary*. And *our Saviour's Name* is made use of to honour some Vegetables: A kind of *Gromel* is called, not only *Job's Tears*, but *Lachrymæ Christi*. *Wild Clary* hath the Name of *Oculus Christi*: *Great Spurge* is called *Palma Christi*, and another *Manus Christi*. The *Apostles* in general (besides those before particularized) have not been forgot by them; for there is a *Medical Oyntment* that hath its Denomination from them: And other Medicaments are entituled *Holy, Divine*, and *by the Grace of God*. It appears from this, that there have been some *Religious People* of this Profession, or else Pretenders to it; and then they were far from being open *Atheists*. We see they have had some Thoughts of *God and Religion*, of *Christ Jesus and Heaven*, and of things and Persons that are *Sacred*.

Not to mention the Praises of *St. Luke*, who was both a *Physician* and an *Evangelist*, and is the brightest Glory of these Artists; there were many others (whom I intend not to enumerate here) who were very great Devotionists, and shewd a mighty Respect to God and Religion. Even *Galen* (though he unhappily reflects on *Moses* and our *Saviour*, being mislead by his Pagan Principles) was in his way Devout, and (as you have heard) broke out into a Celebration of God's Good-

ness, Wisdom and Power from the Consideration of the Structure of Man's Body. I have made mention of several of the *Moderns* before, who, like true Pious Philosophers, often take occasion in their Writings to remind the World of a Supreme Being, and to own and reverence his Authority. I will here add concerning *Sennertus*, that he not only shews himself every where in his Works, a very *Religious Physician*, but he composed and published a *Book of Meditations and Prayers*, which is a farther Evidence of his Piety. *Gesner*, a Physician of *Zurich*, in his Books of *Animals*, takes notice of the All-Wise Maker, and quotes several Passages out of the *Holy Scriptures*. *Bauhinnus* speaks very divinely when he discourses of the Fabrick of the *Ears*.

That Eminent Physician of our Age Dr. *Willis* gave as great Proofs of his Godliness as of his Learning: He was as conversant in the Practice of Piety as in that of Physick. Whilest he lived he was a constant frequenter of the Prayers of the Church, and at his Death he left a Salary to maintain the Offices of Devotion for ever. And herein he was followed by the honourable Mr. *Boyl*, who, though he was no professed Master of *Medicks*, yet was skill'd in the Art and in all Natural Philosophy which is so requisite to it: This Excellent Person, to give a lasting Demonstration

monstration of his being highly concerned for Religion, bequeath'd an honourable Allowance for the maintaining of a perpetual Theological Lecture, wherein the *Christian Religion* is to be asserted and detended against its Chiefest Adversaries, and particularly and expressly his Will is, that *Atheists* should be attack'd with the utmost Strength of Argument. *Dr. Woodward*, a professed *Physician*, speaks like a Religious Philosopher in his *Natural History of the Earth*, and owns the Divine Wisdom and Contrivance. But I must forbear to mention the Living. Thus we see that this Rank of Students are disposed to be Religious, and their Employment leads them to it, because they are continually studying and contemplating the Works of God.

If you ask why the Lives of such Men are not *always* Good; yea, why they do not excel? I ask you again; why do not *Sextons* and *Grave-makers* live better than other People, seeing they converse with the dead, and are constantly reminded of Mortality, and another World? Nay, you may as well ask why every individual *Clergy man* is not transcendently Good and Vertuous, since their Business and Calling are in themselves conducive to it. The true cause of this is want of Serious Attention and Due Application. So it is here, a *Physician*, as such, would naturally

rally prove a Good Man, but then he must seriously and attentively lie under the Influence of his Principles, and suffer the Virtue of them to take hold of him, and not willfully and stubbornly throw it off. For, though his Calling is in it self an Antidote against Atheism, yet it will not have its Effect if he takes a Counter-Potion. So then, if you should find that these Artists have less Religion than other Men, it is not to be attributed to them because they are skill'd in their Art, but because they abuse it.

The short of all is, their searching into the Works of Nature is able to render them Wise and knowing Persons; Men of great Insight and Sagacity. Whence, among the Ancients *Apollo* was the God of *Wisdom* and *Medicks*. And this may be signified in the consecrating of a *Serpent* to *Æsculapius* the God of *Physick*. And this Study also, if duly managed and applied, will make those that are conversant in it as Good as they are Wise: For Physicks do naturally conduct to Ethicks. A Natural Philosopher will be, if not otherwise hurt, a Good Moralist. His intimate conversing with Matter and Bodies will raise him to an Apprehension of an All-Wise Spirit. Though he deal in Groveling Vegetables, and stoops and bends to the Earth to gather them; yet, even this Posture makes him more Erect towards Heaven,
and

and exalts his Mind to the Author of Nature. An *Anatomy Lecture* is a Preparative to one of *Divinity*: And whilest he views and considers the Exactness of the *Humane Fabrick*, he is thence effectually provok'd to acknowledge, revere, and worship the *Divine Architect*.

FINIS.

ERRATA.

PART I. page 88. line 27. read *correct*. p. 121. l. 1. r. *Stagyrite*
 p. 174. l. last but one r. *there by*. p. 192. l. 21. r. *Halieutichs*.
 p. 204. l. 24. for *there* r. *they*. p. 229. l. 5. r. *noted*.
PART II. p. 46. l. last but one r. *admitting*. p. 48. l. 7. r. *insire*.
 p. 50. l. 22. insert *perhaps* before *not*. p. 64. l. 22. r. *Colick*. p. 72.
 l. 19. r. *come*. p. 75. l. 11. after *manner* make (;). p. 88. l. 19. r. *719*.
Bondy. p. 94. l. 1. blot out (,). And some other Literal Faults
 require Amendment.

Books written by the Reverend Mr. John Edwards.

AN ENQUIRY into several Remarkable Texts of the Old and New Testament, which contain some Difficulty in them, with a probable Resolution of them, in two Volumes in 8°.

A Discourse concerning the *Authority, Stile and Perfection* of the Books of the Old and New Testament, with a Continued Illustration of several Difficult Texts throughout the whole Work, in three Volumes in 8°.

Some Thoughts concerning the several Causes and Occasions of Atheism, especially in the present Age, with some brief Reflections on Socinianism, and on a late Book entitled *The Reasonableness of Christianity as delivered in the Scriptures.* 8°.

Now in the Press and will speedily be published.

A Discourse shewing the Unreasonableness of a Late Writer's Opinion concerning the *Necessity of only One Article of Christian Faith*: And of his other Assertions in his late book of *the Reasonableness of Christianity*, and in his *Vindication* of it. With a Brief Reply to another (professed) Socinian Writer.

All sold by Jonathan Robinson at the Golden Lyon, and John Wyat at the Rose in St. Paul's Church-yard, 1696.

e
:
f
s
-
n
s